

Building Construction Plates

FOR STUDENTS AND OTHERS.

PART II.

ADVANCED COURSE

(Primarily intended for use in Classes).

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Battersea Polytechnic, etc.)

and W. H. HUDSON (late Lecturer on Building Construction, Battersea Polytechnic, etc.)

- | | | | | | |
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| 69 | Mansard Roof. | 90 | Bath, Lavatory Basins and Sinks. | 111 | Steel Roof Truss for 50-ft. Span. |
| | | | | 112 | Steel and Concrete Roof. |

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STRUTTING TO TRENCHES.

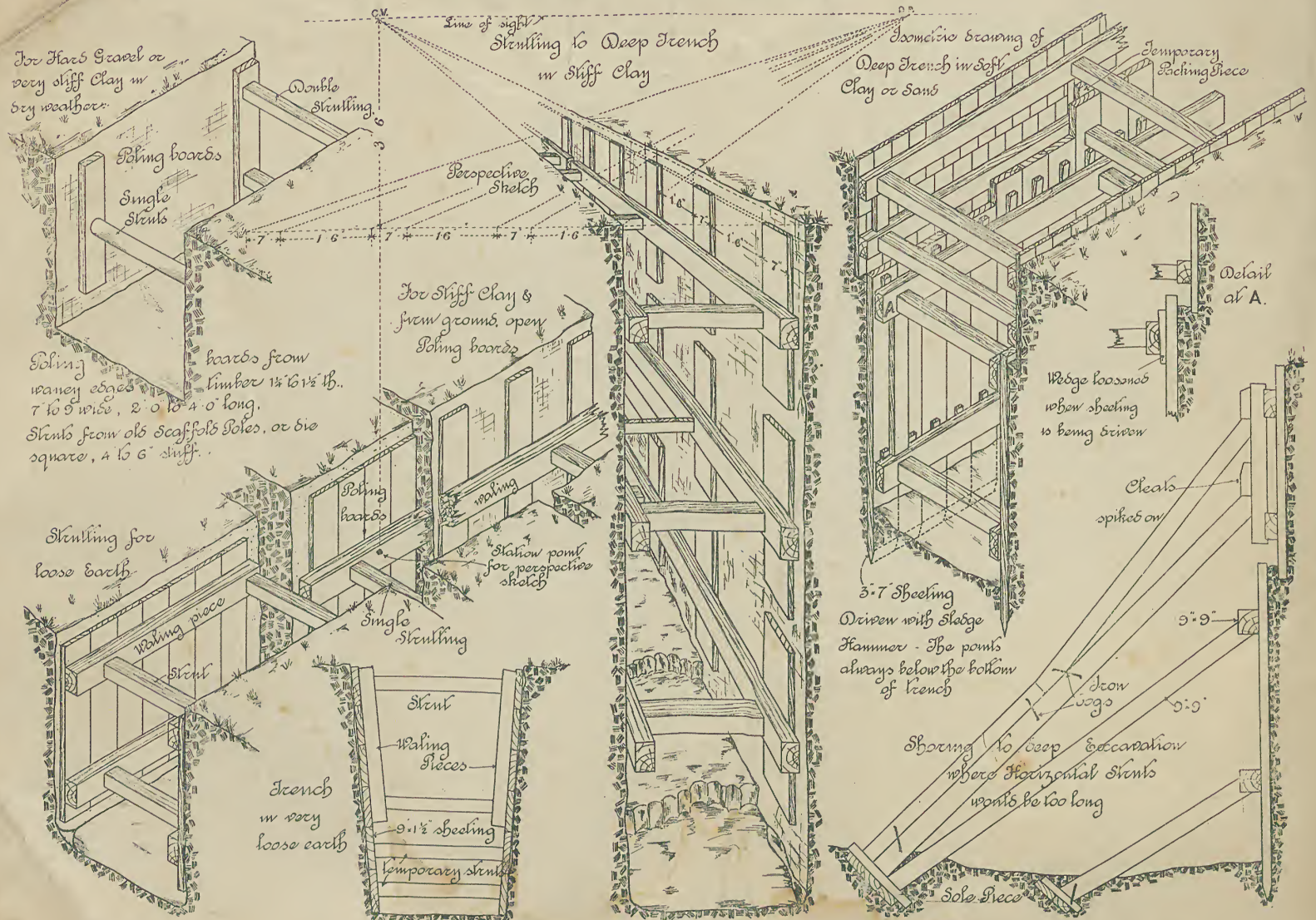
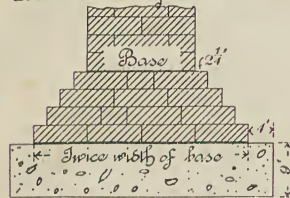


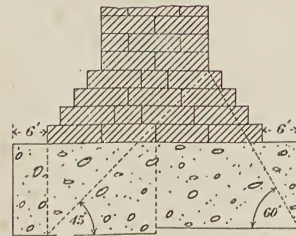
PLATE 50.

FOUNDATIONS—BRICK AND CONCRETE.

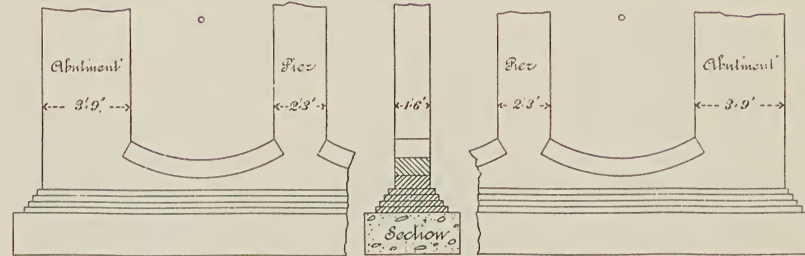
Minimum dimensions of footings & concrete, in accordance with London Building Act, 1894.



Methods for determining depth of concrete for foundations



Inverted Arches



Planked Foundation (May be used with concrete under)

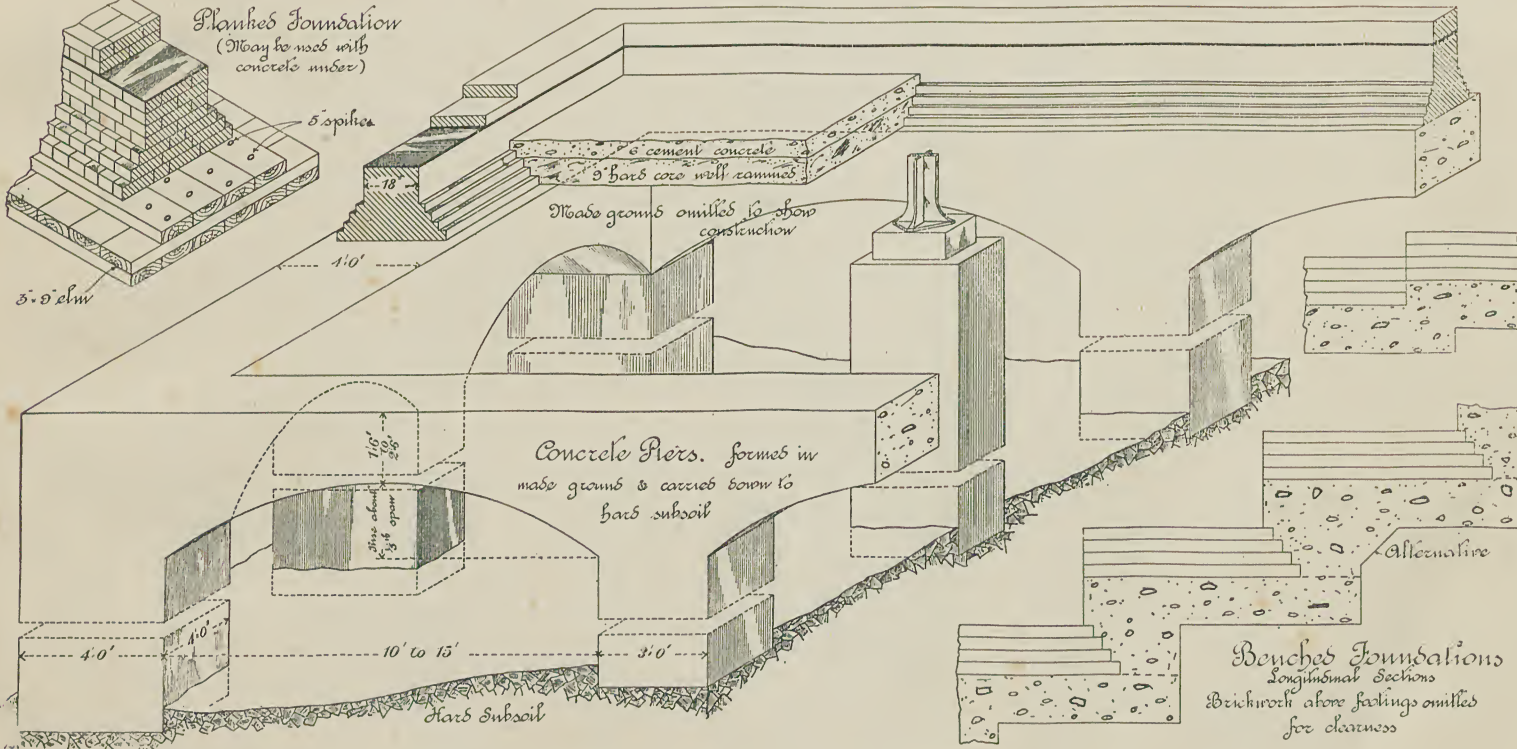
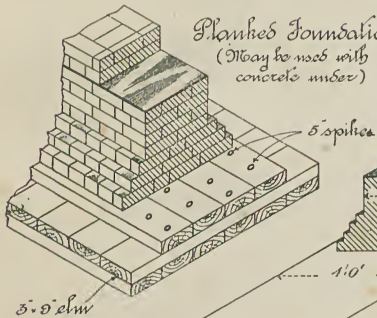


PLATE 51.

FOUNDATIONS—TIMBER PILING.

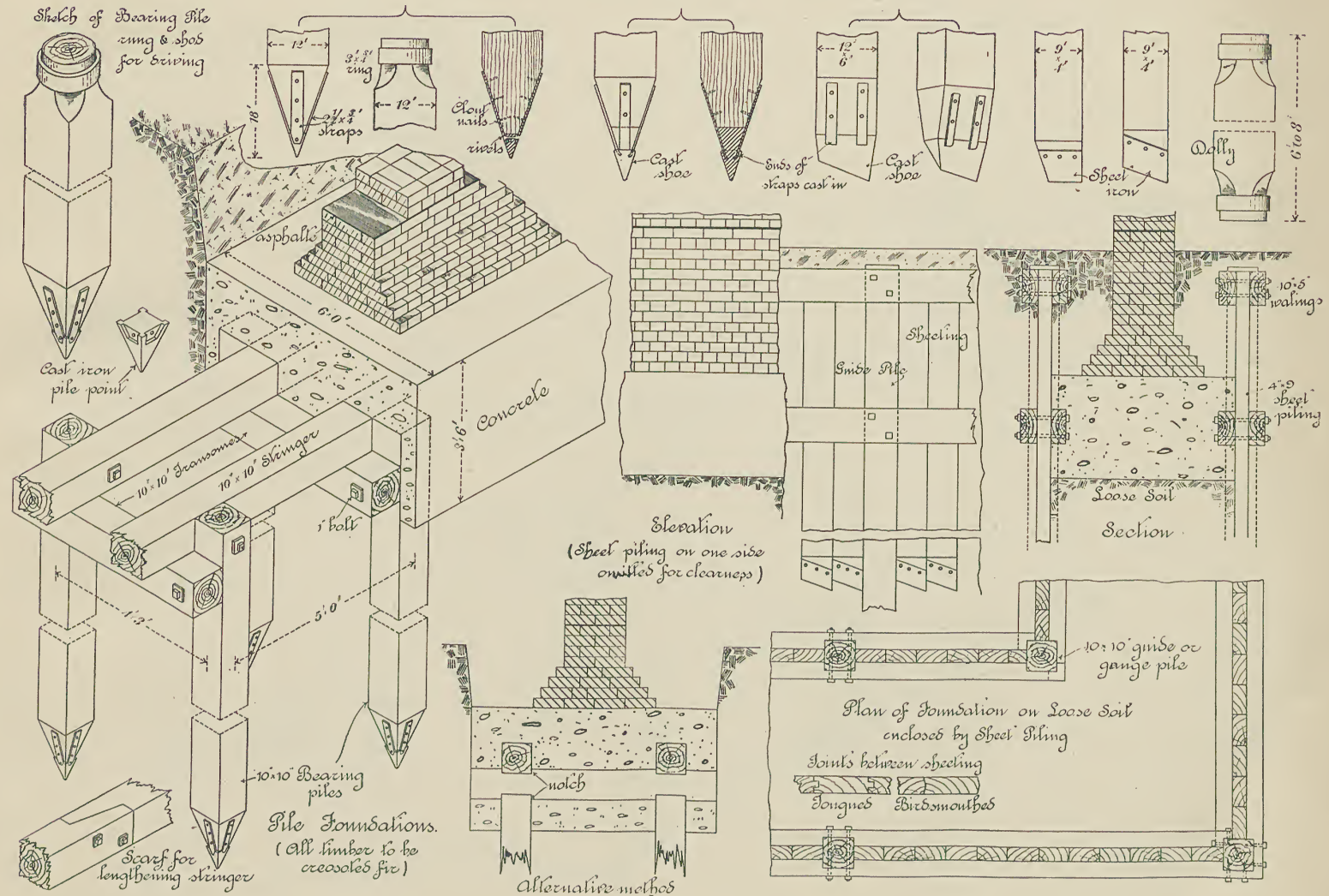
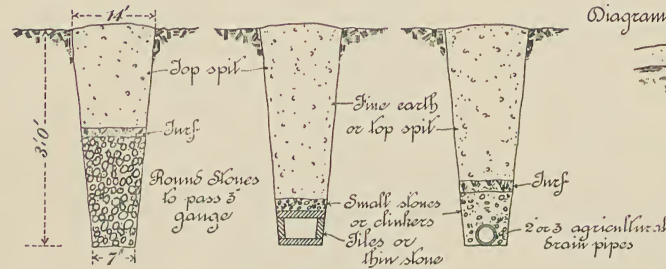
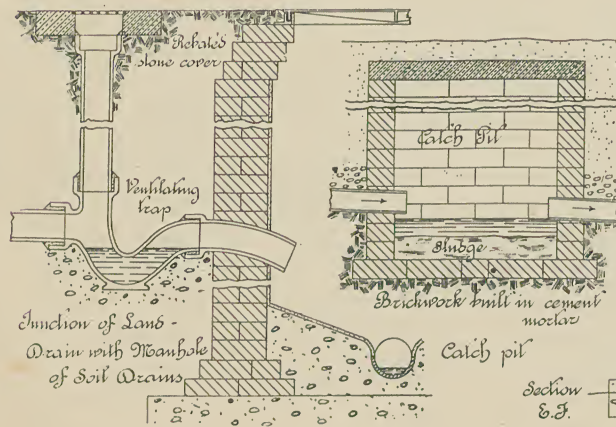
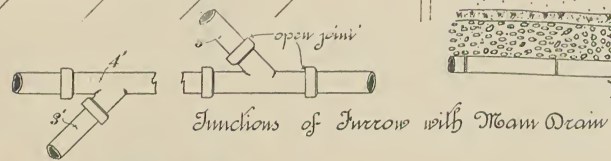
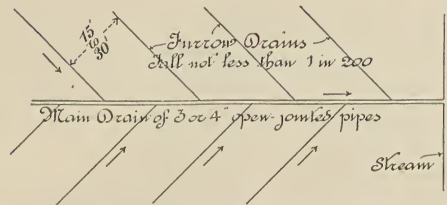


PLATE 53.

LAND DRAINAGE TO SITE, &c.



Sections through Inflow Drains

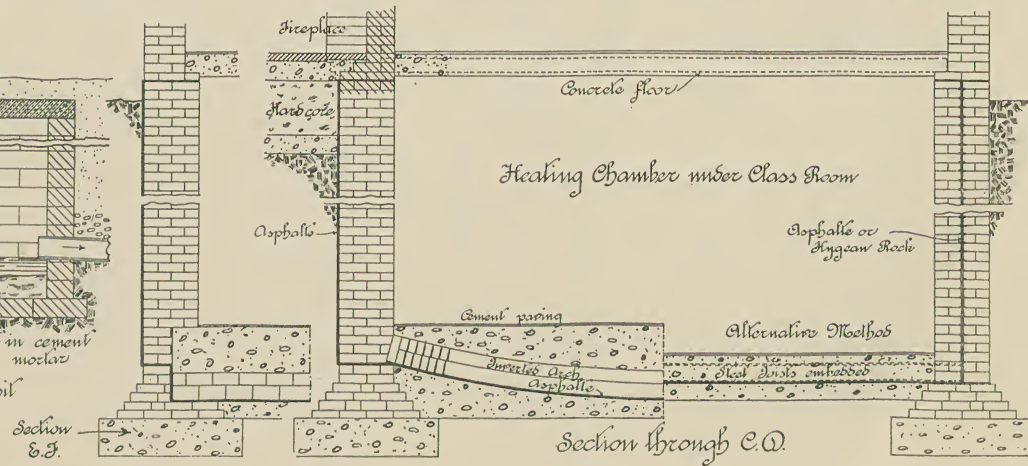
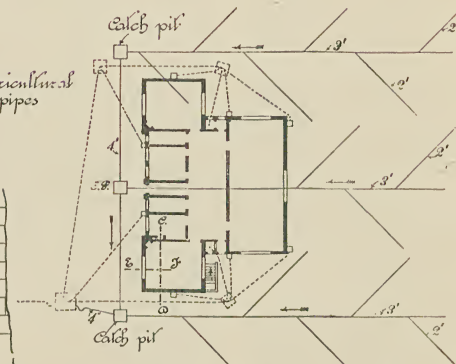
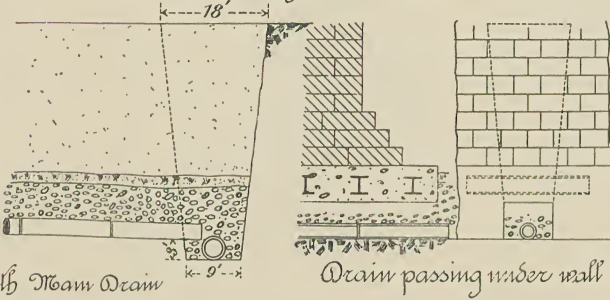
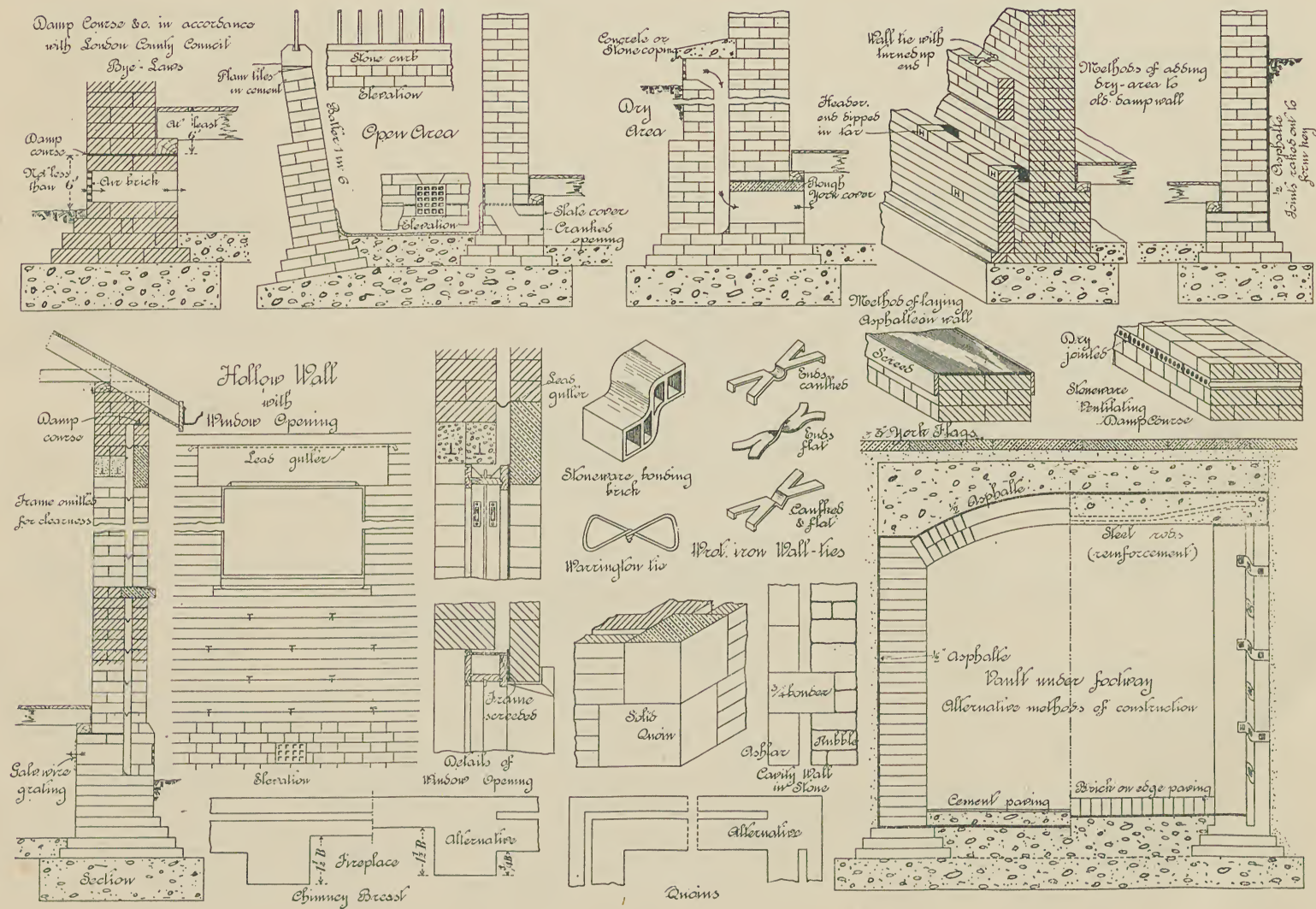
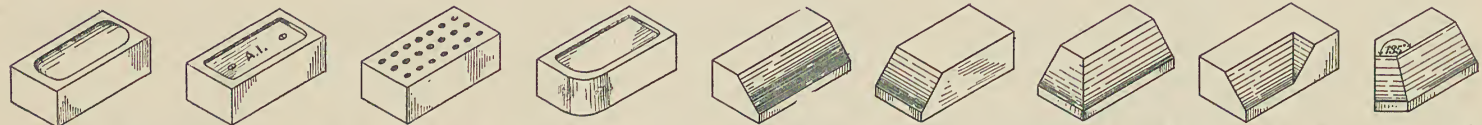


PLATE 54.

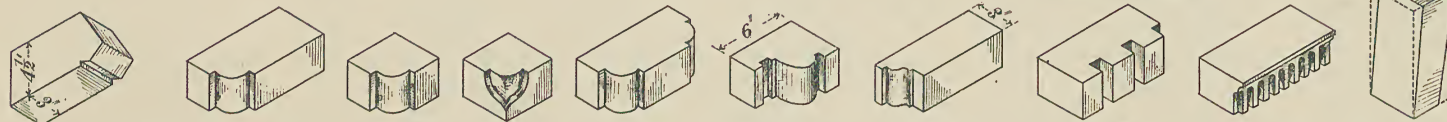
PREVENTION OF DAMP IN WALLS.



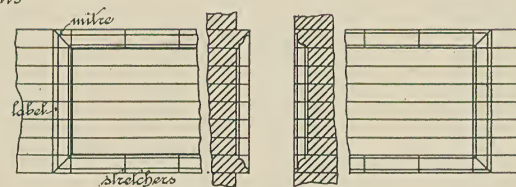
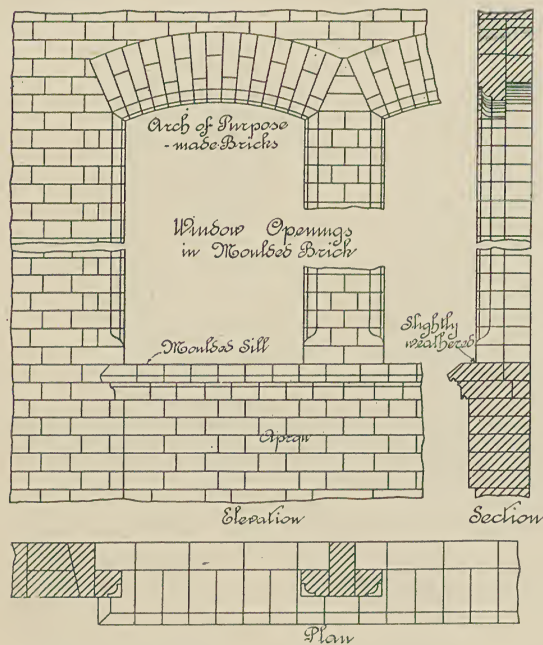
BRICKWORK—PLAIN AND MOULDED.



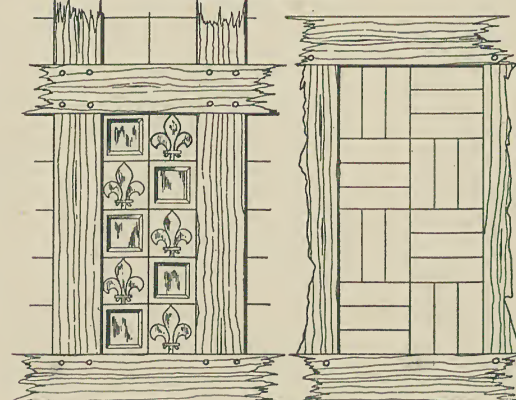
Hand-moulded Machine pressed Perforated Wire cut Bull-nose Stretcher Header External Angle Internal Angle 45° Bay Angle
Plinth Splays



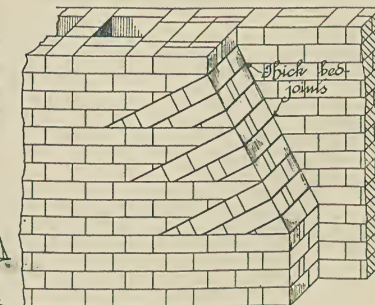
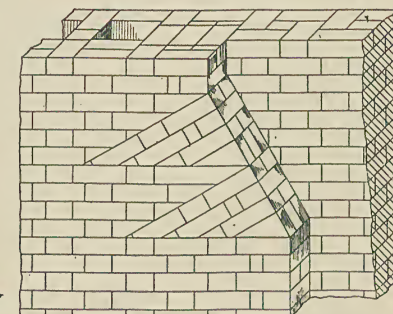
4 1/2" String or Sill Stretcher Half Stop Double 6" Architrave Label Dentil Enrichment Radiating
Lambs & Mullions



Moulded Panels

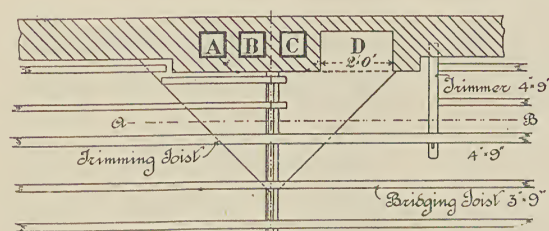


Diaper Panels

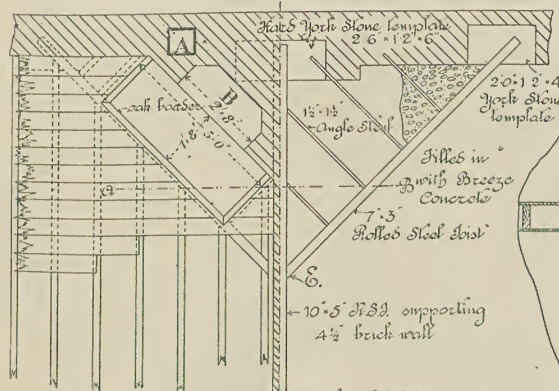


Brick Butt joints
Imbruing in Courses

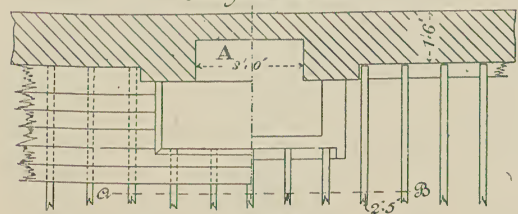
BRICKWORK—ANGLE FIREPLACE.



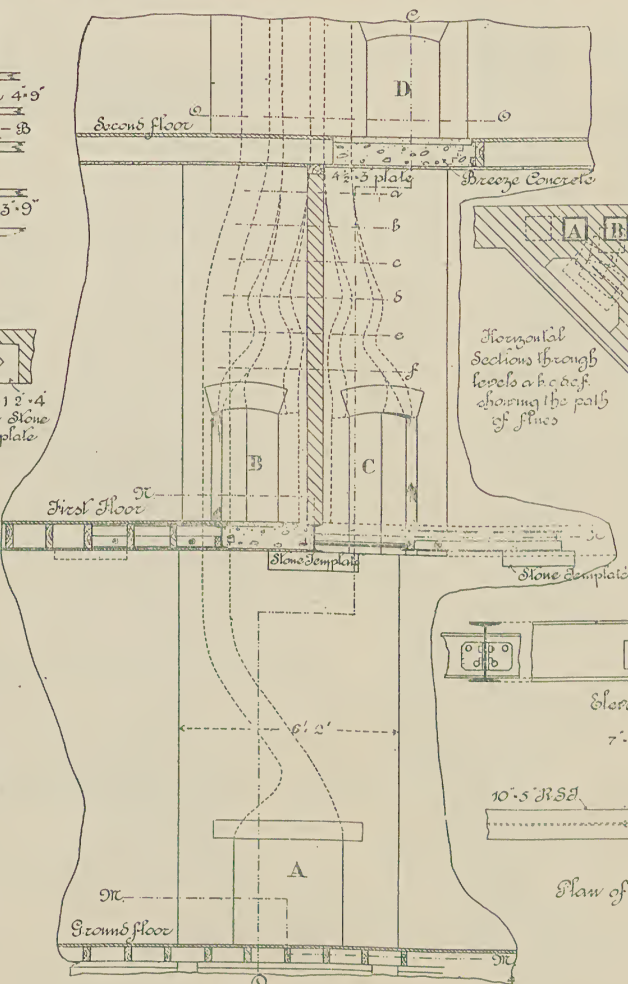
Horizontal Section O.O.



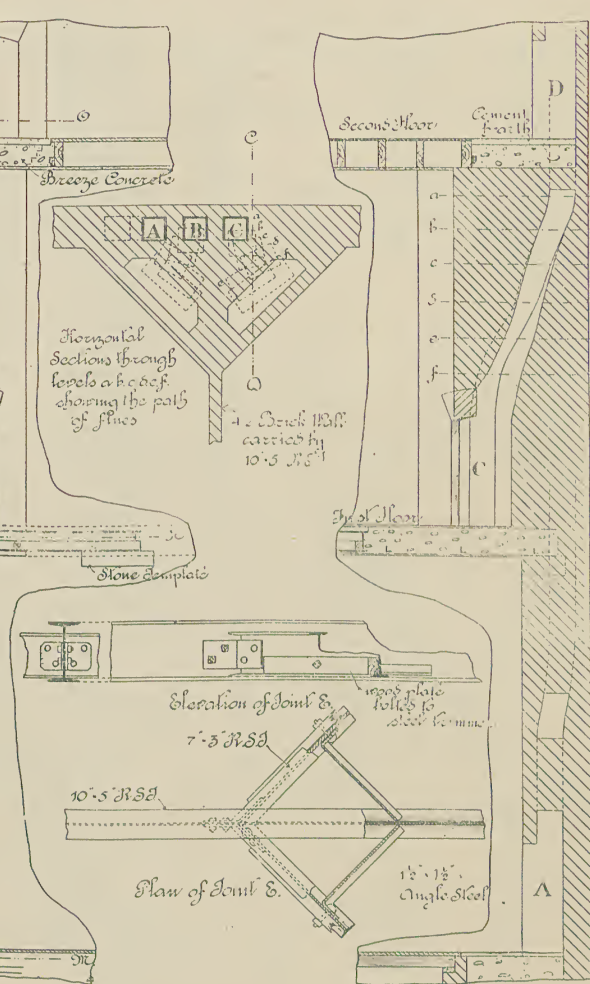
Horizontal Section N.N.



Horizontal Section M.M.

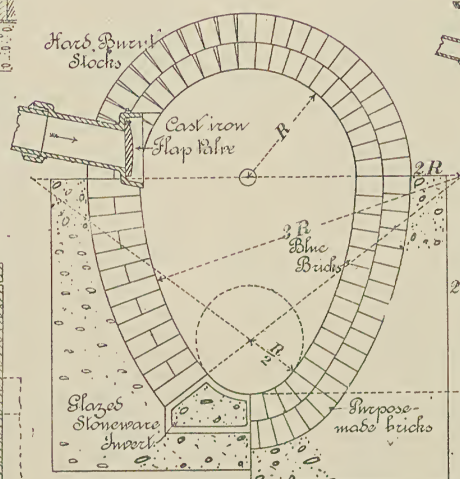
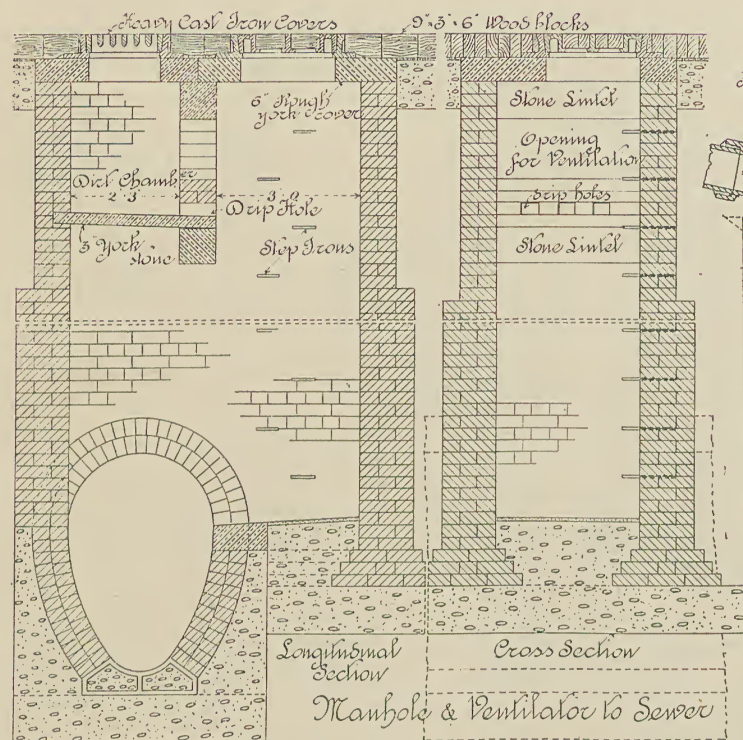


Vertical Section A.B.

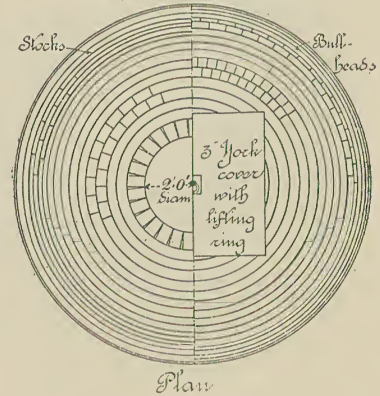
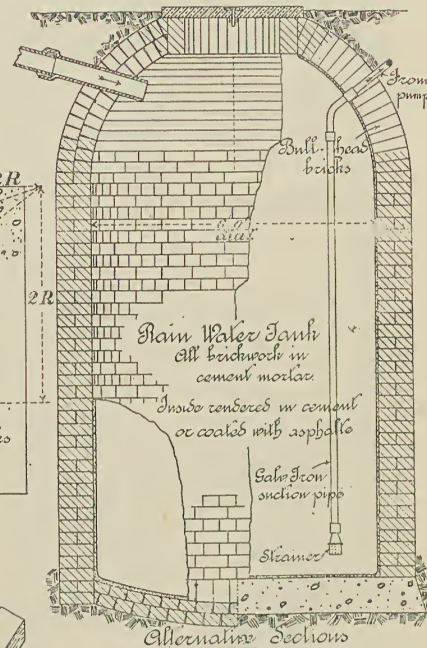
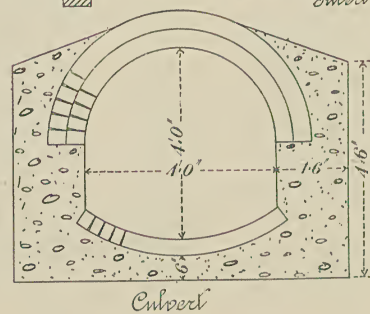
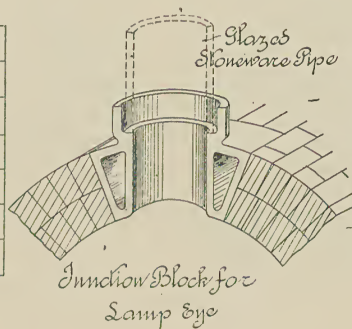
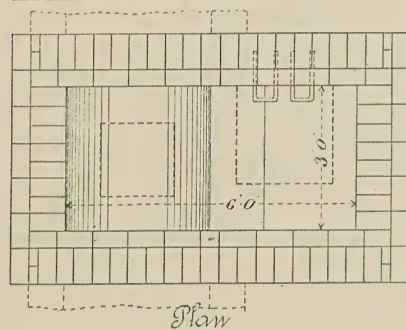


Vertical Section C.D.

BRICKWORK—SEWERS, TANKS, &c.



Egg-Shaped Sewer
Alternative methods of construction.
All brickwork in cement mortar.



MASONRY—ORIEL WINDOW.

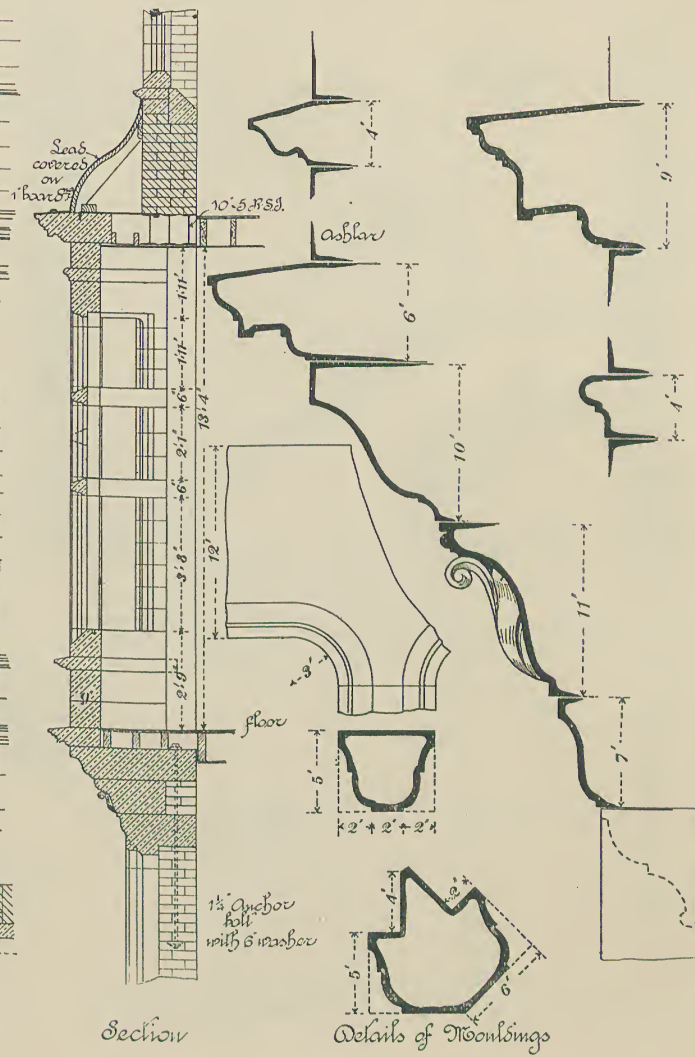
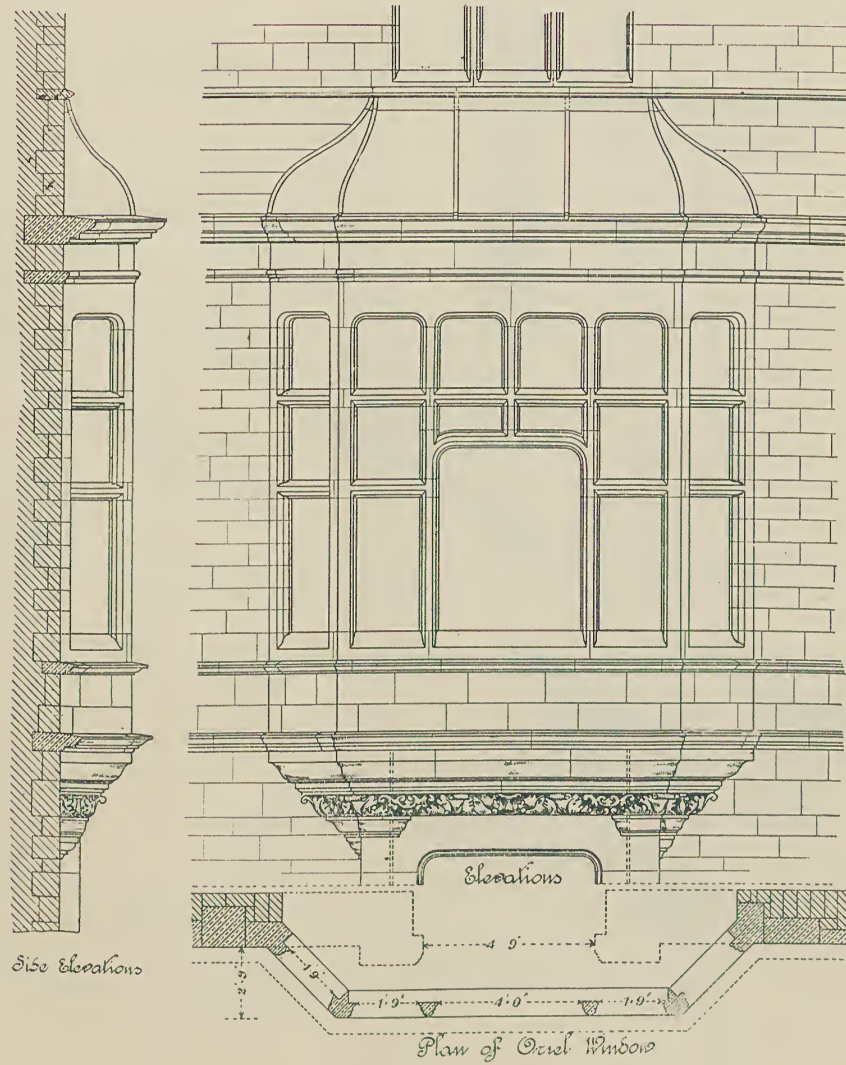
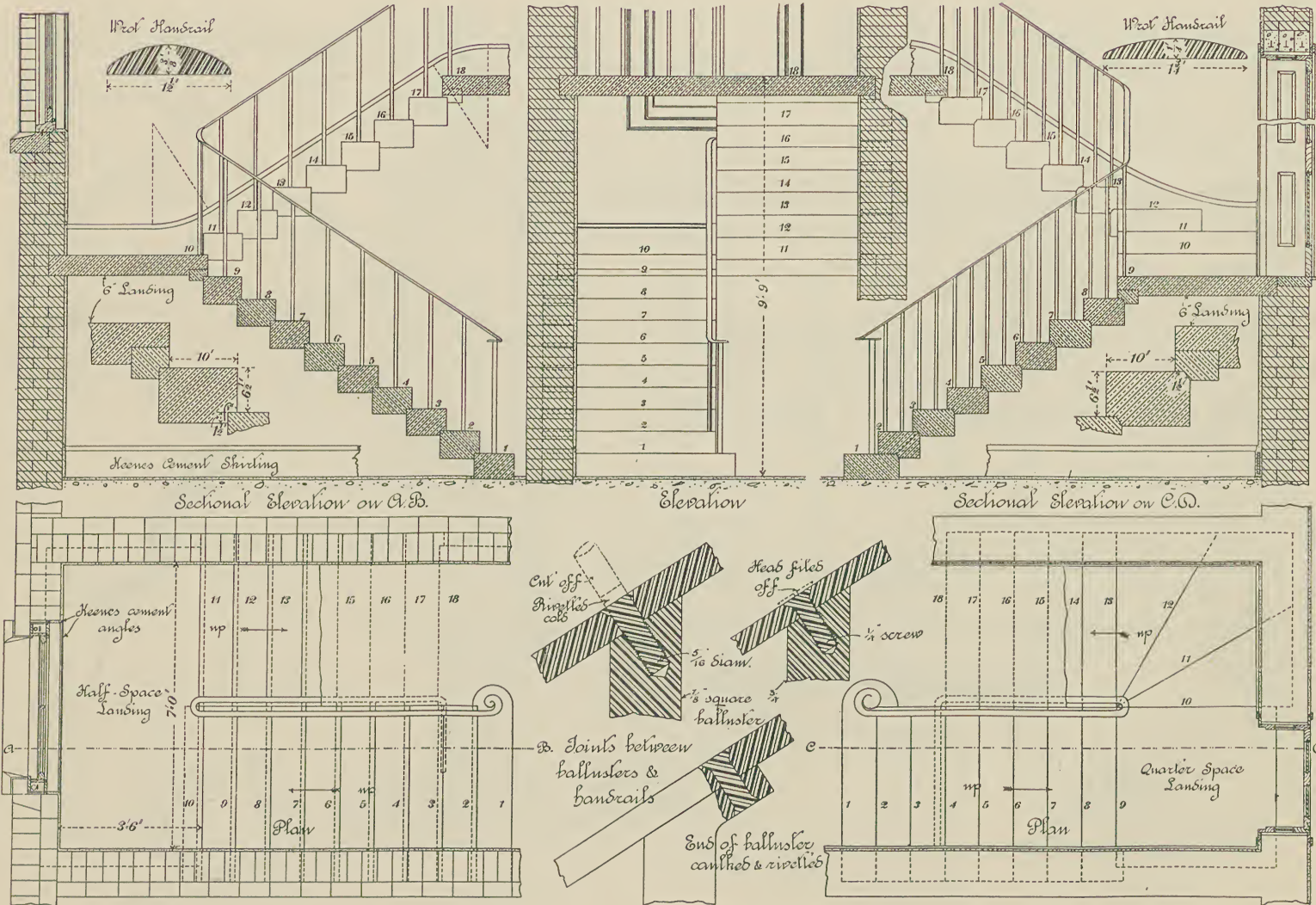


PLATE 59.

MASONRY—DOG-LEGGED STAIR.



MASONRY—GEOMETRICAL STAIRS.

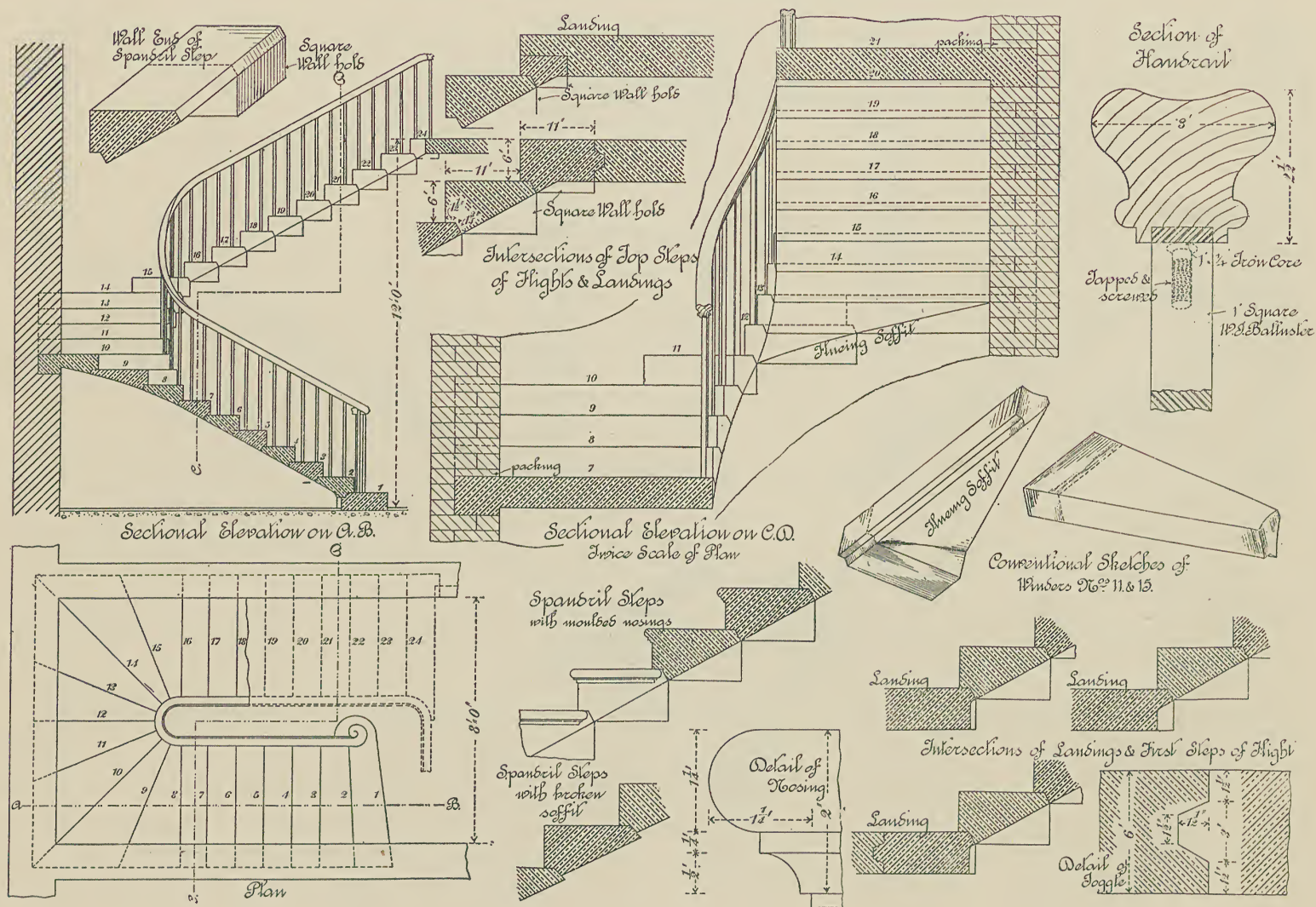


PLATE 62.

FIRE RESISTING FLOORS.

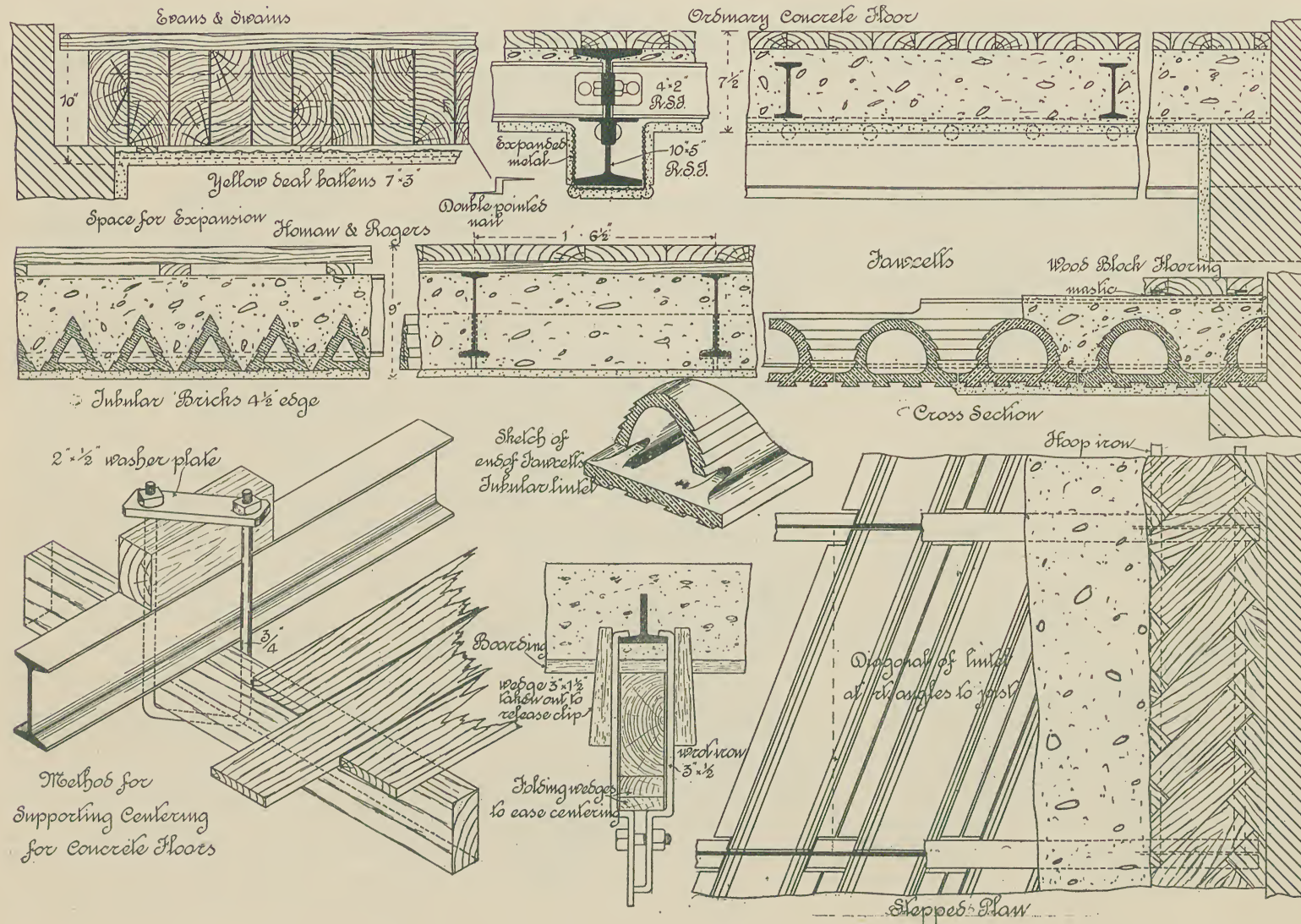


PLATE 63.

FERRO CONCRETE FLOORS.

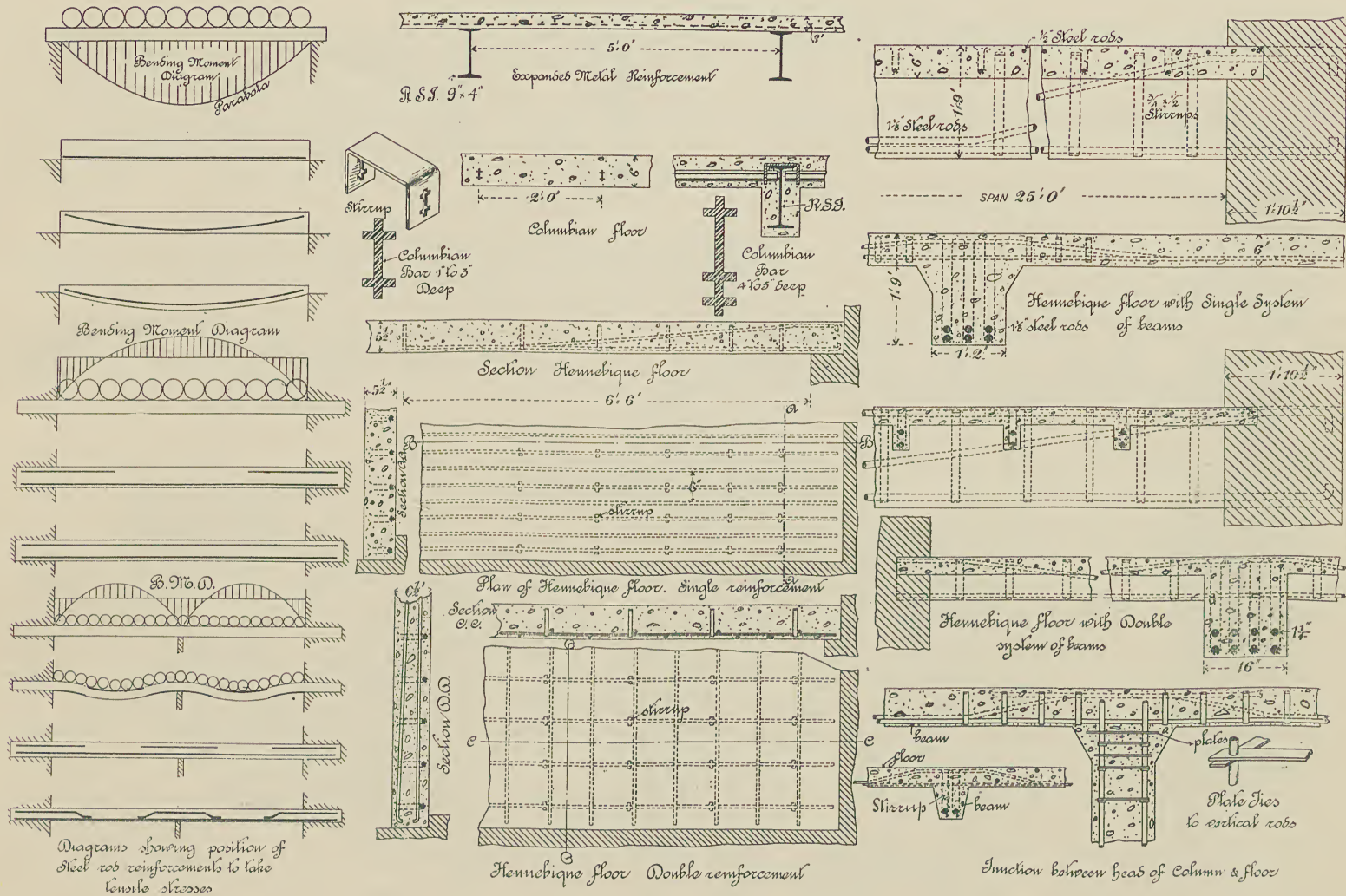
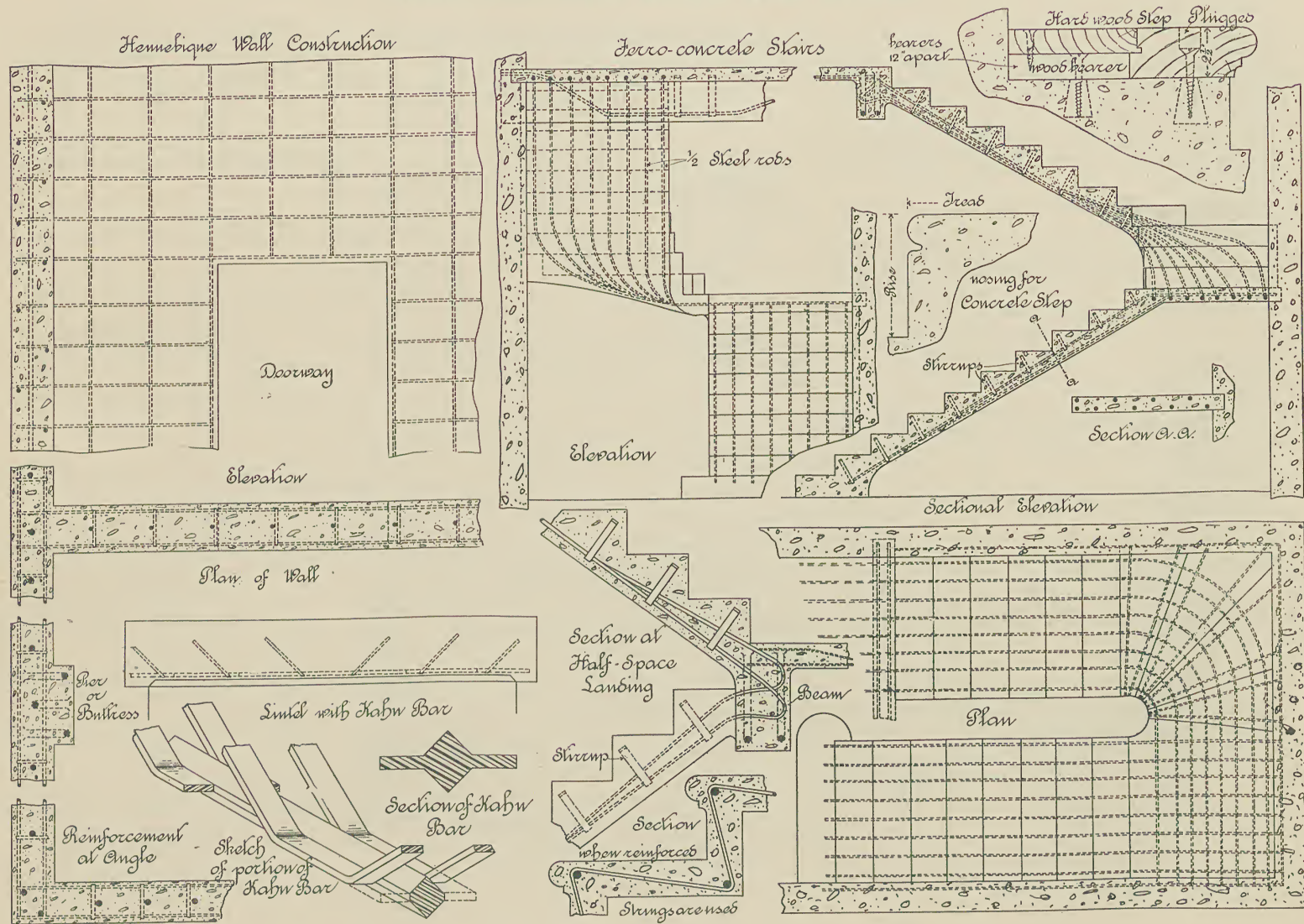
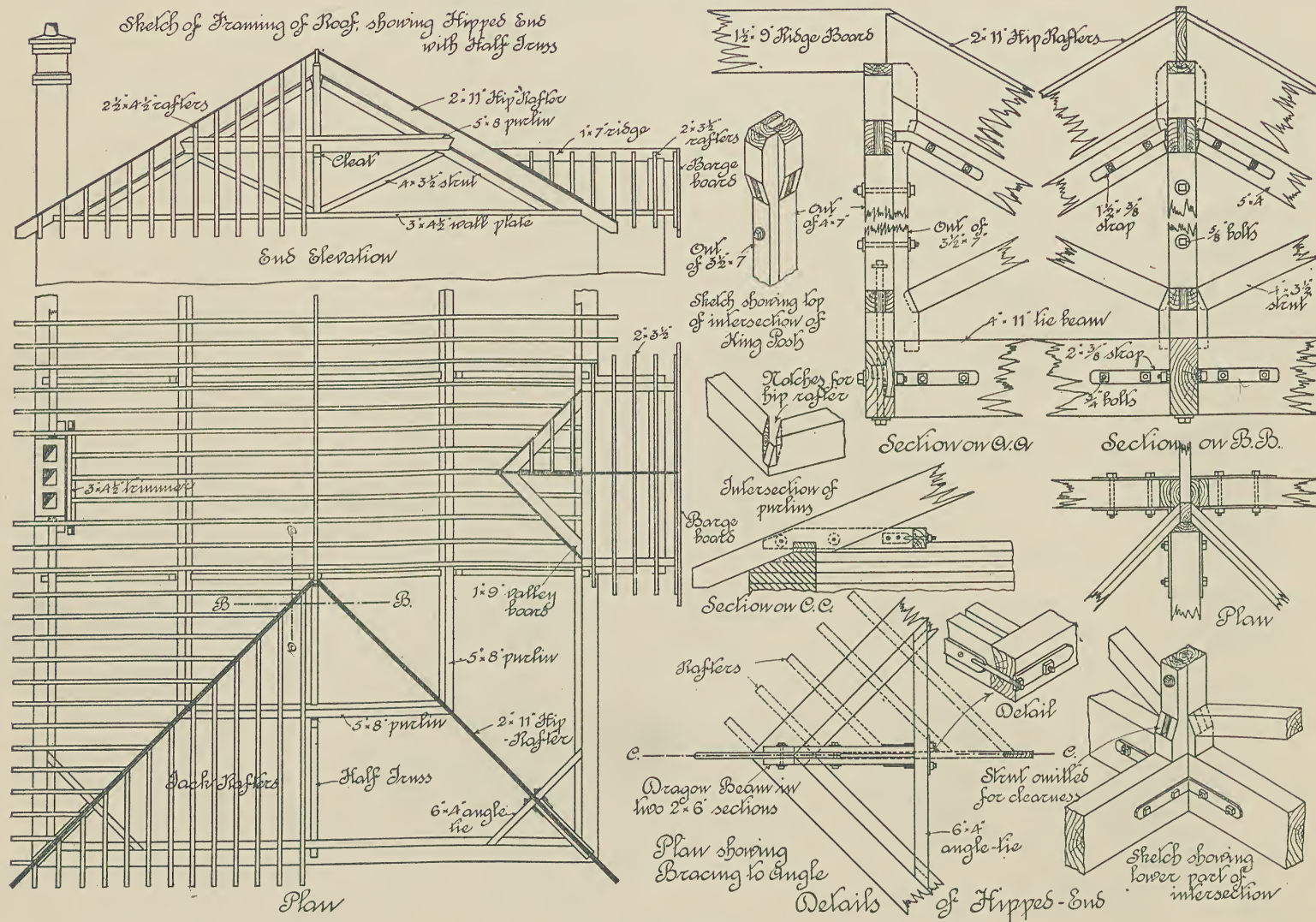


PLATE 64.

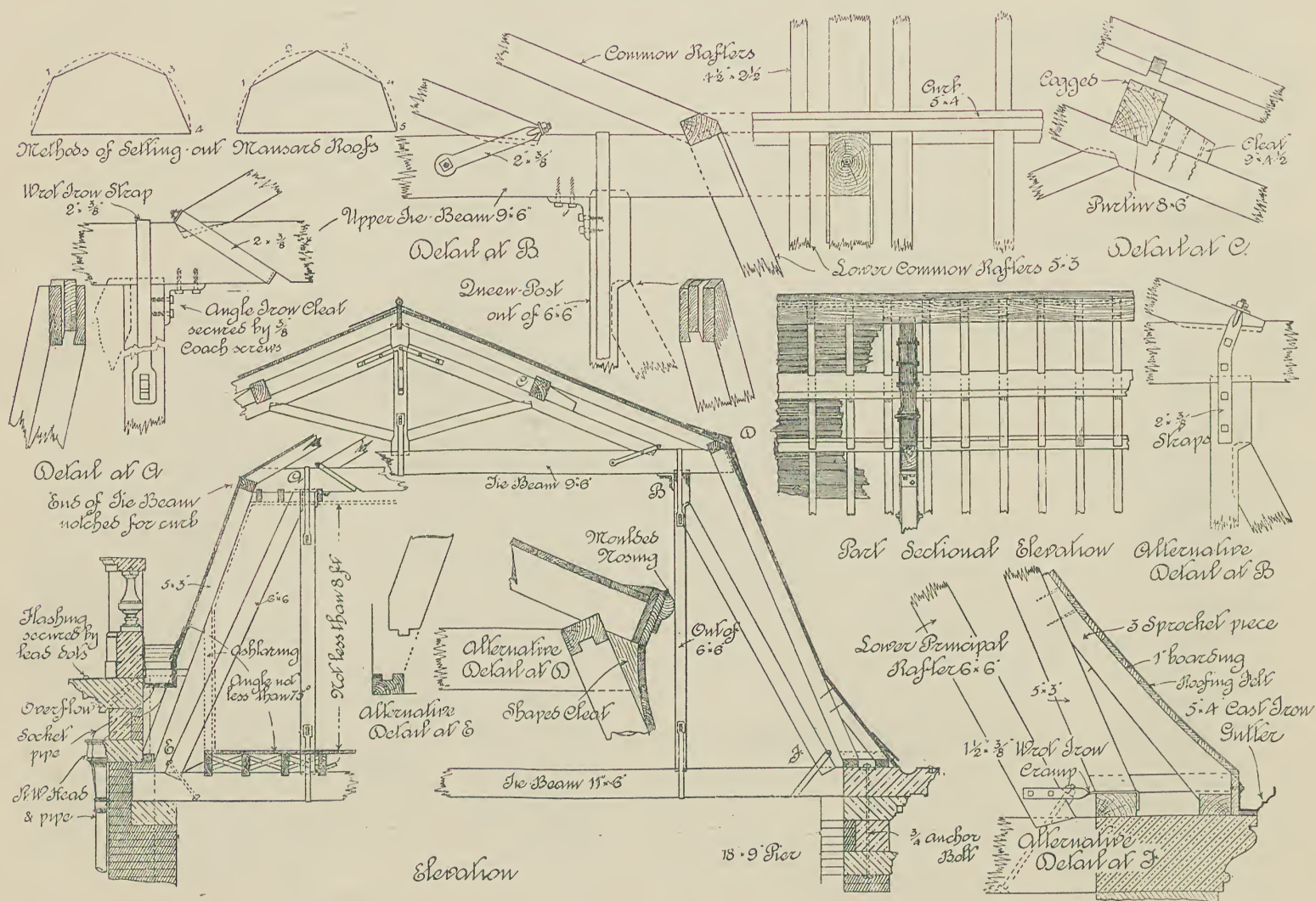
FERRO CONCRETE WALLS AND STAIRS.

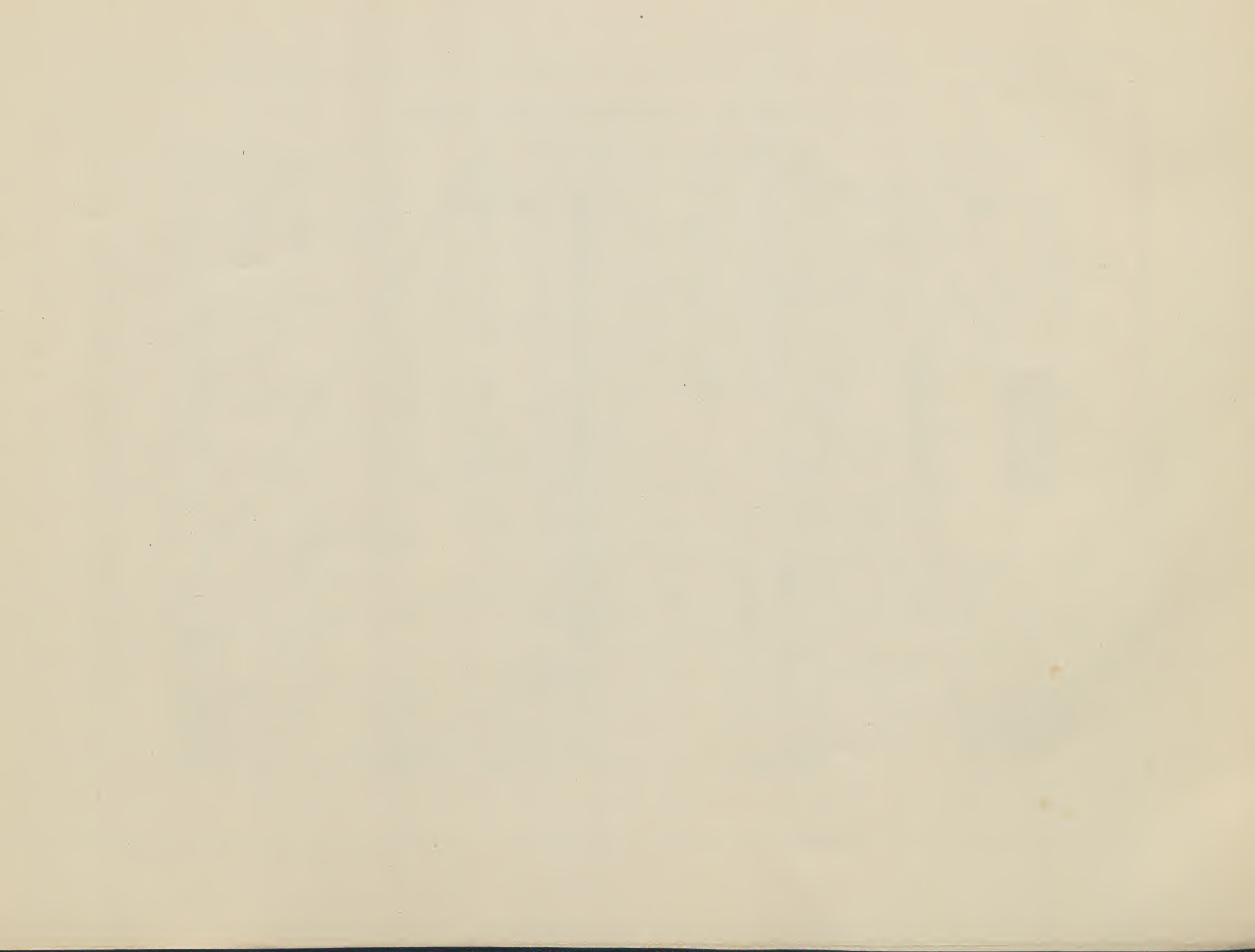


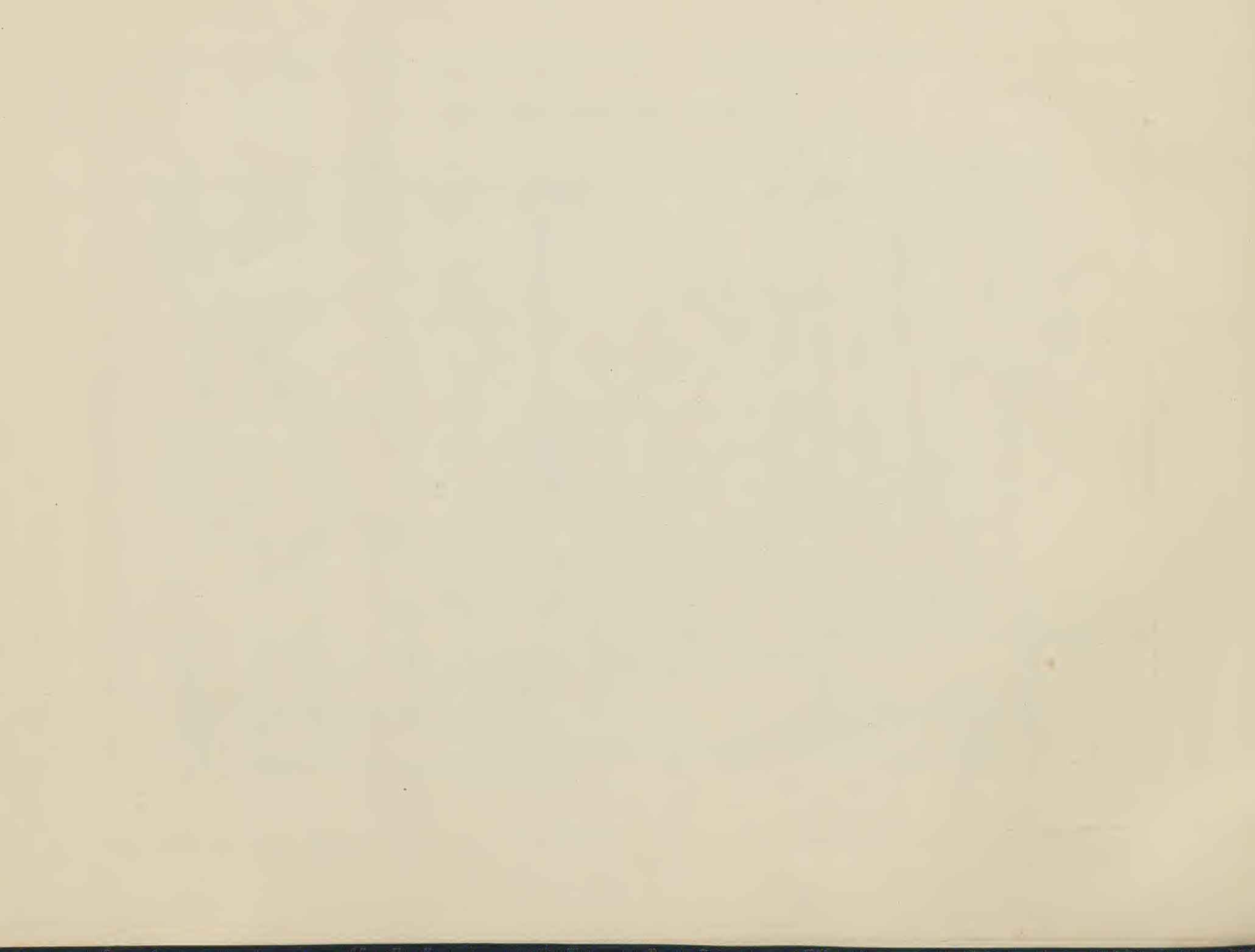
ROOF WITH HALF TRUSS.



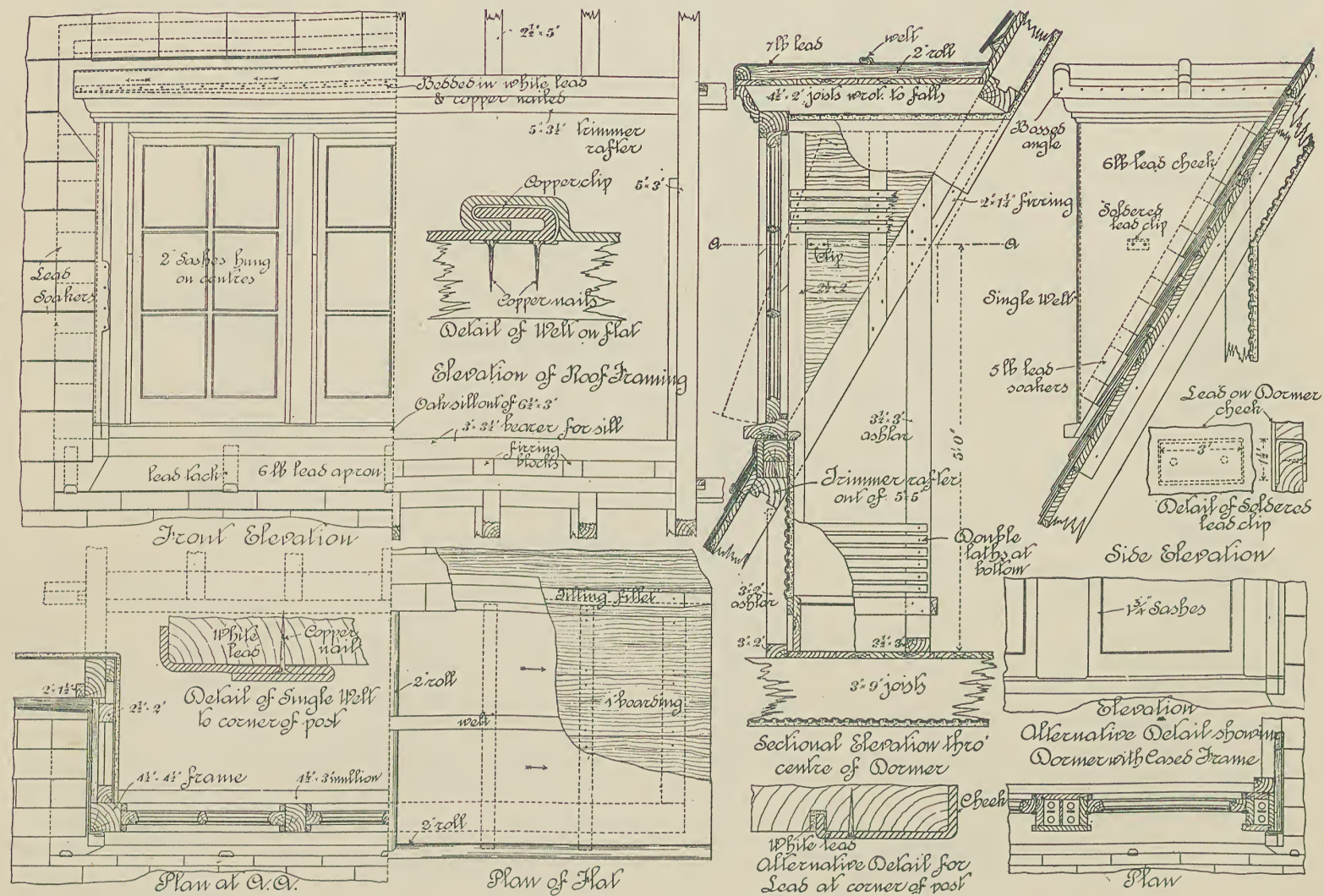
MANSA RD ROOF.



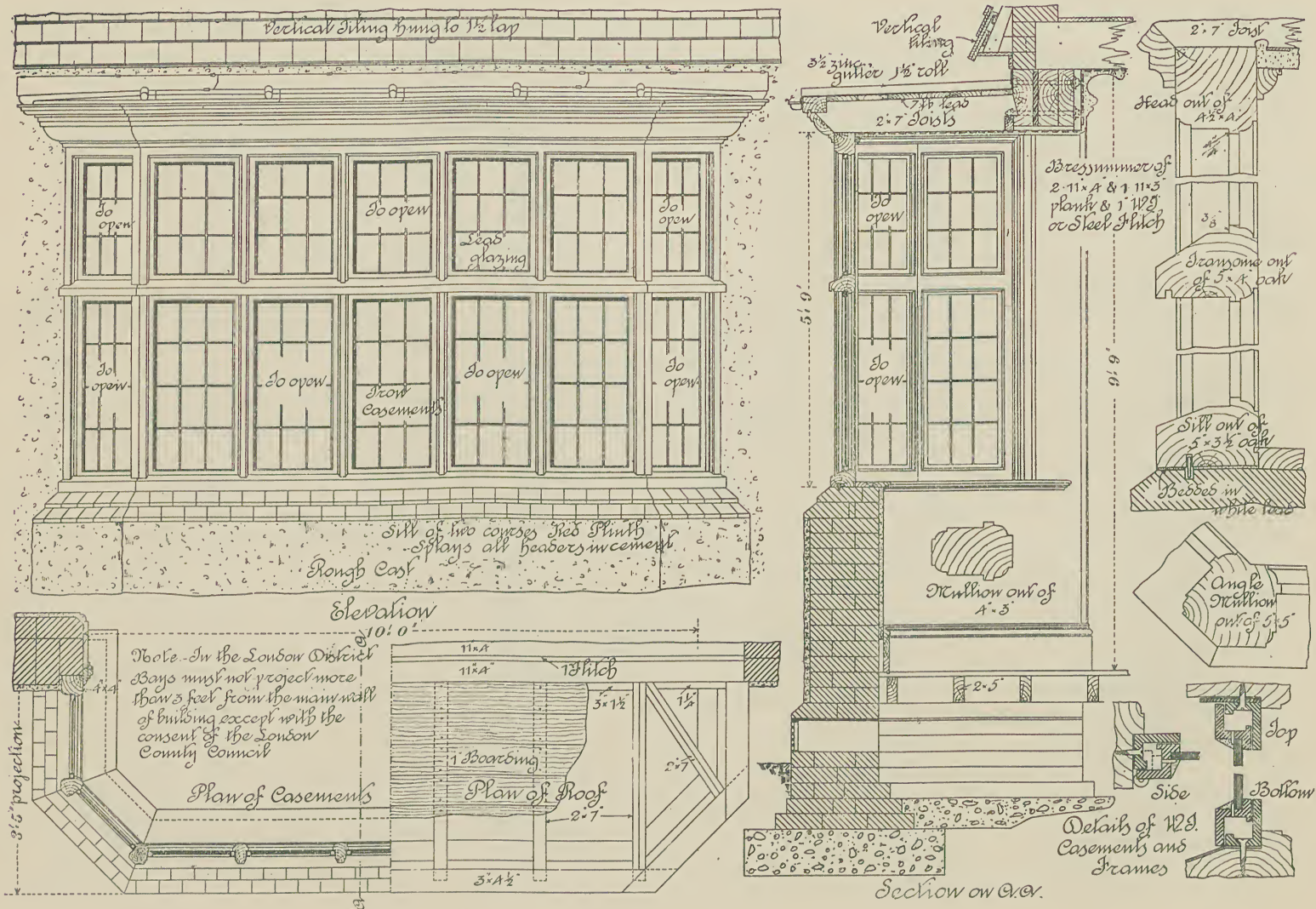




DORMER WINDOW DETAILS.

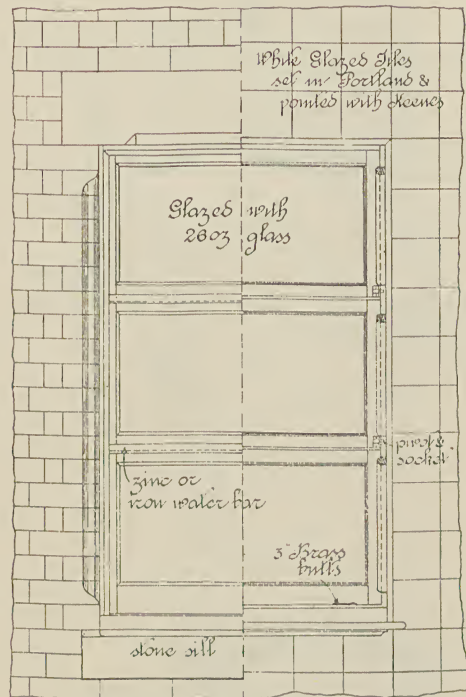


BAY WINDOW FOR COUNTRY HOUSE.

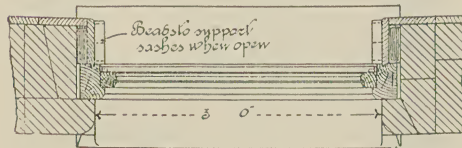


HOSPITAL AND YORKSHIRE WINDOWS.

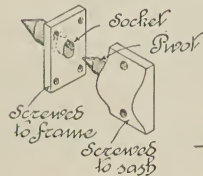
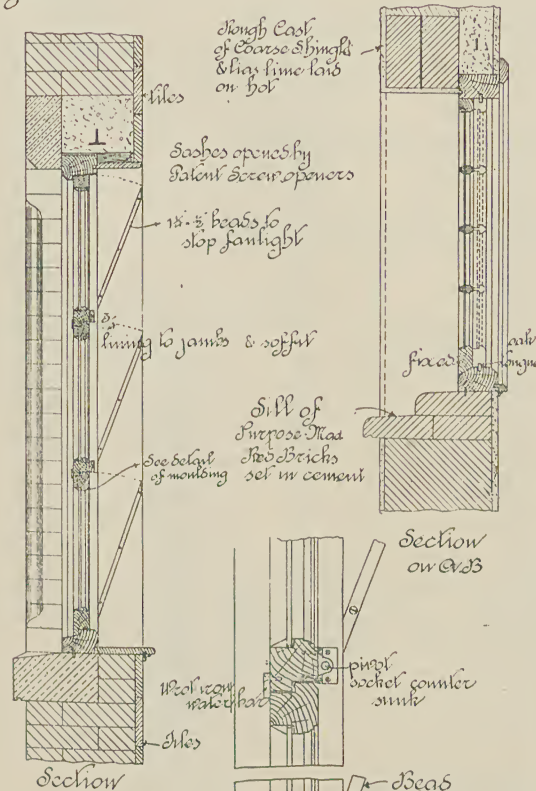
Hospital Window in Three Lights



Half External Half Internal

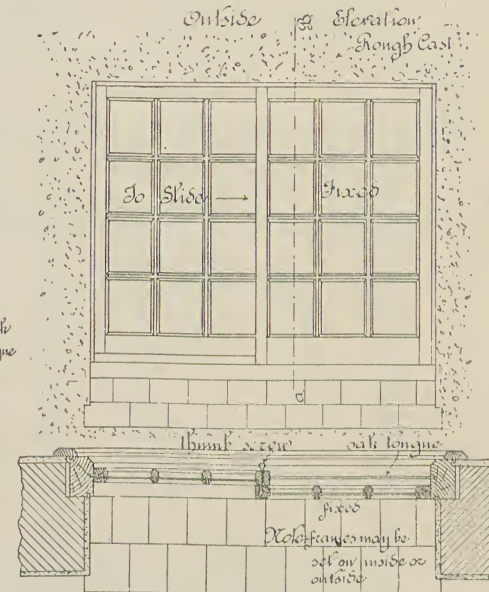


Plan

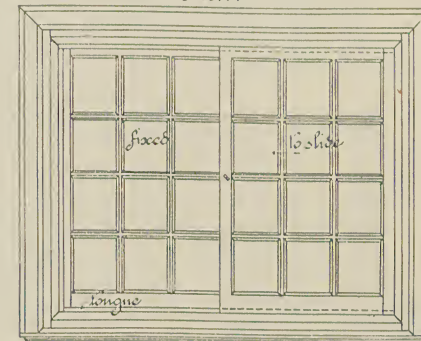


Enlarged Details of Hospital Window

Yorkshire Light

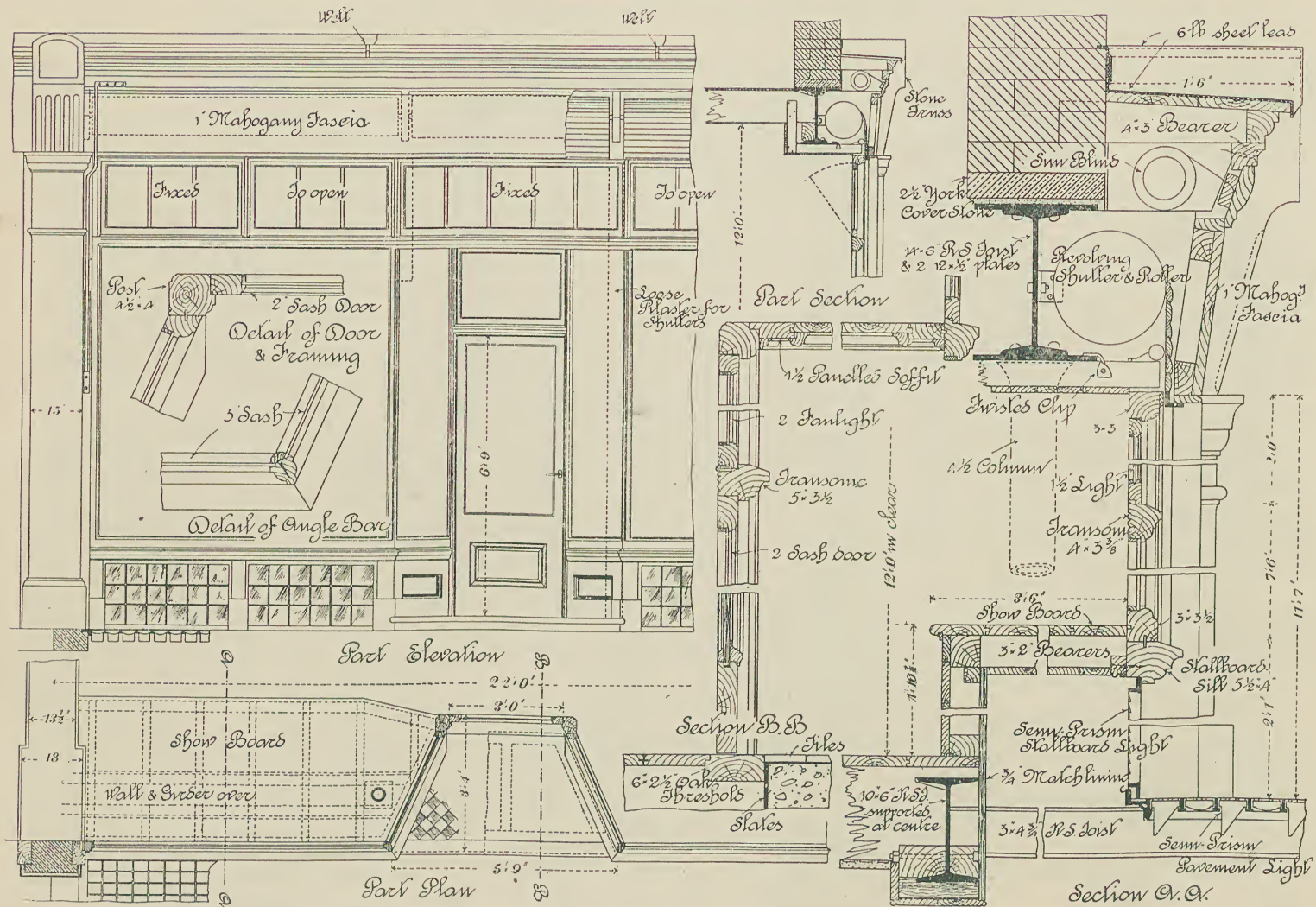


Plan

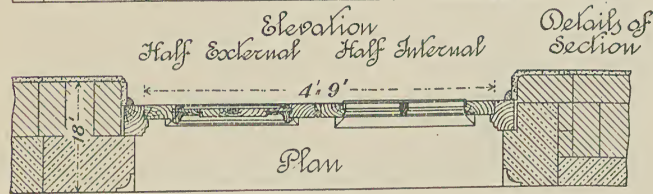
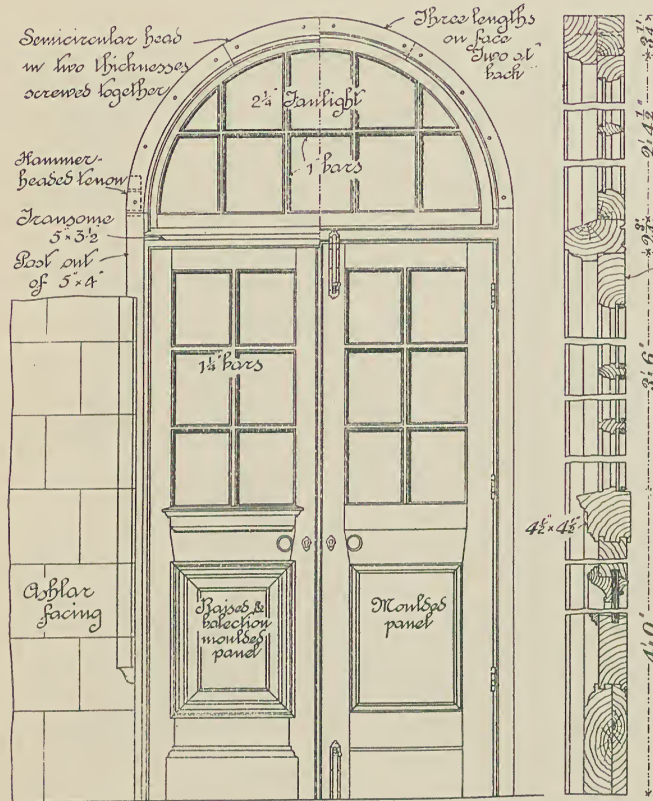


Inside Elevation

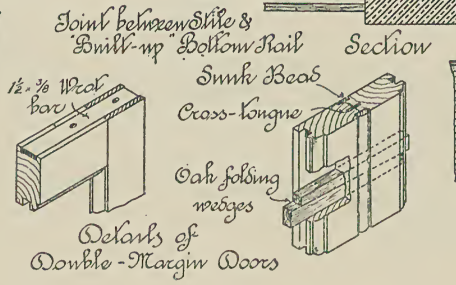
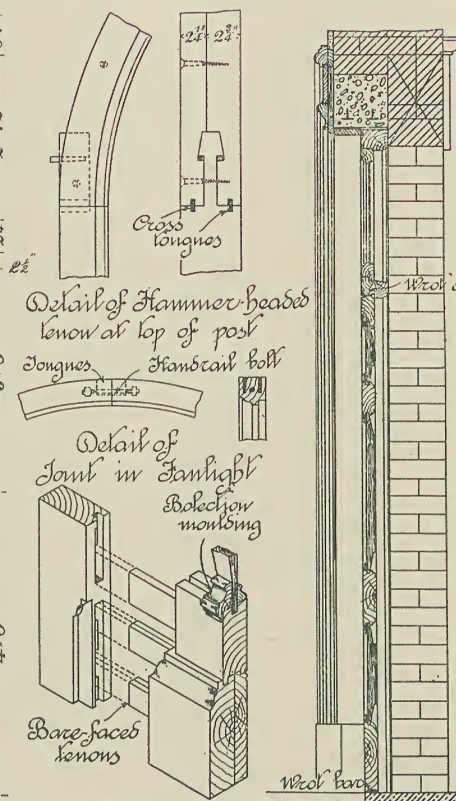
SHOP FRONT.



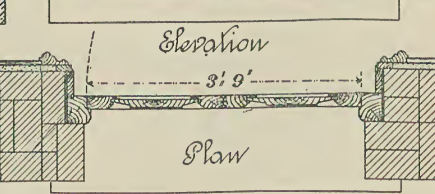
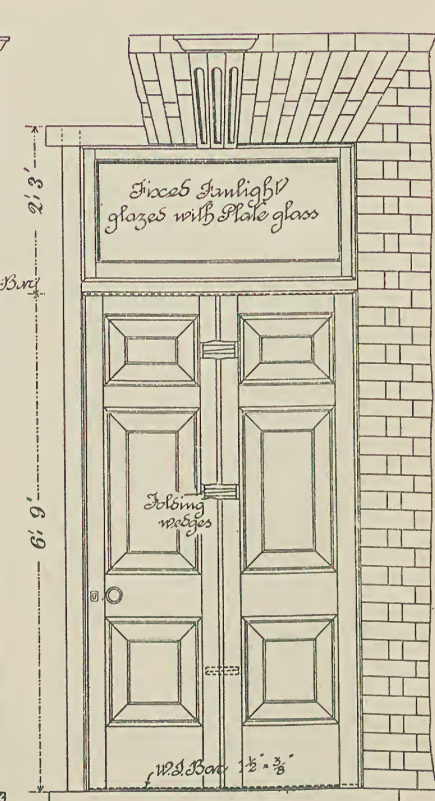
EXTERNAL DOORS.



Folding Sash Doors for Entrance of Public Building



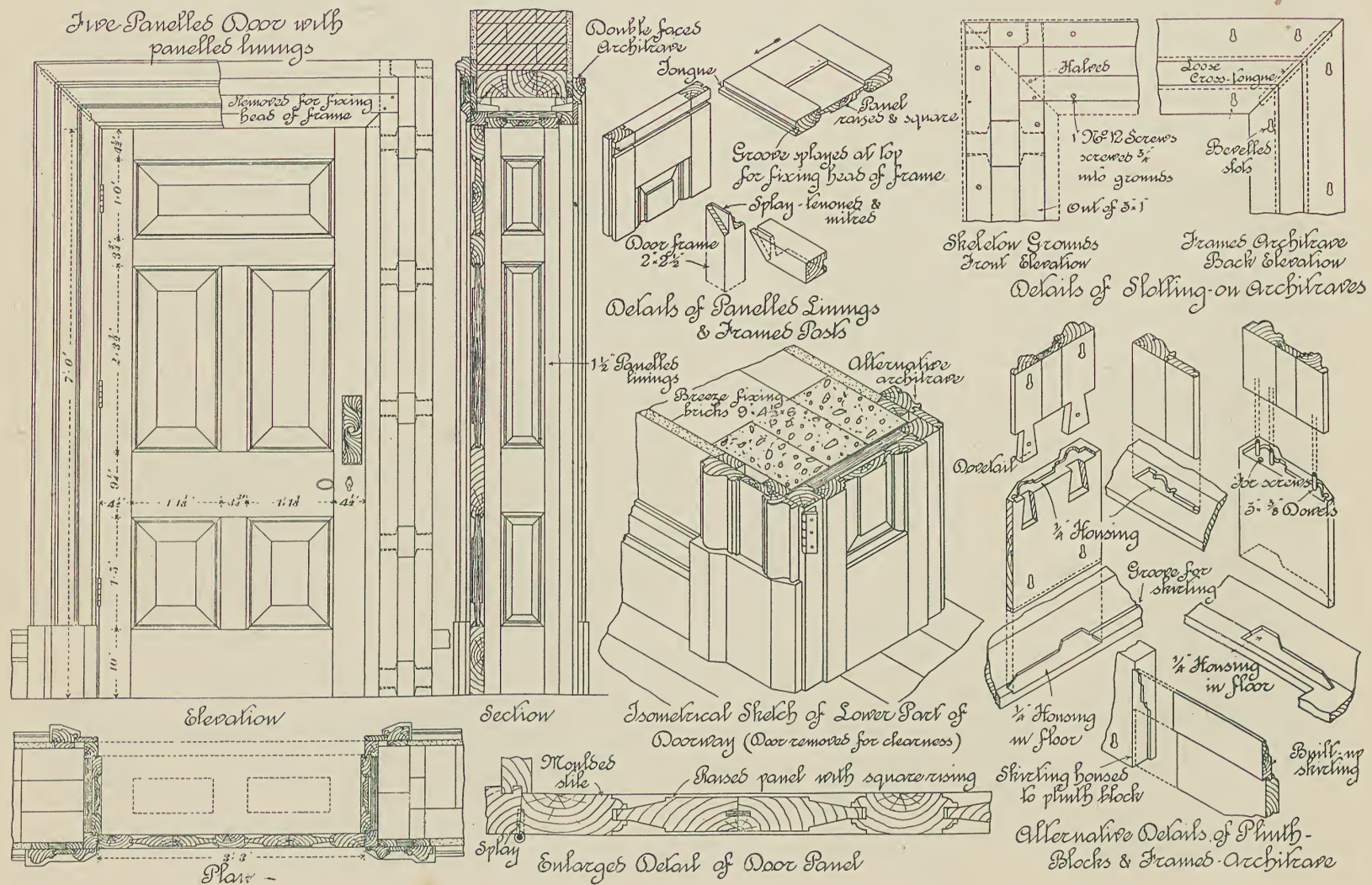
Detail of Double-Margin Doors



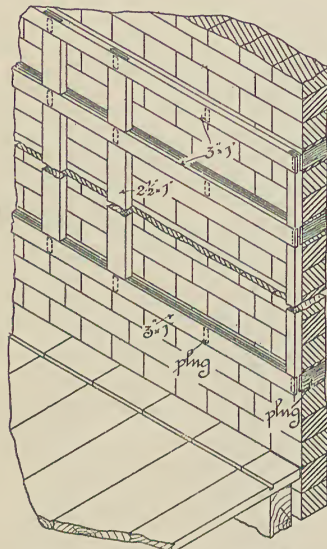
Double Margin Entrance Doors for a small Town House

PLATE 77.

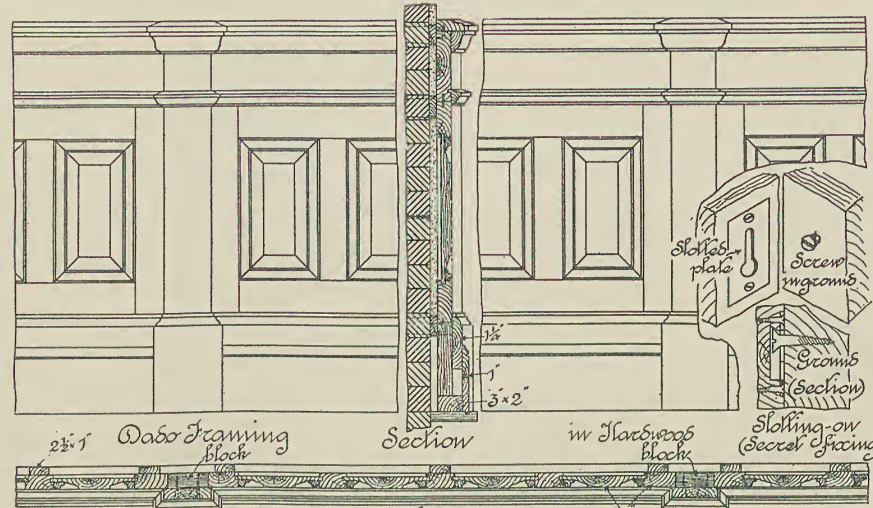
INTERNAL DOOR WITH PANELLED LINING.



PANELLED DADO WITH SKIRTINGS.

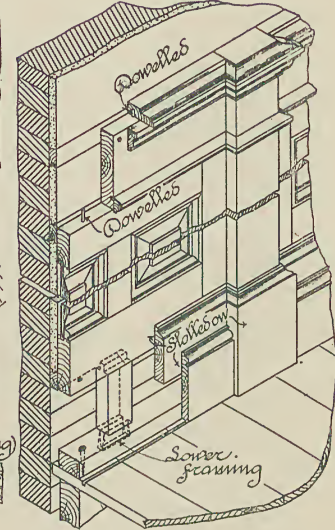


Sketch of Framed Backings

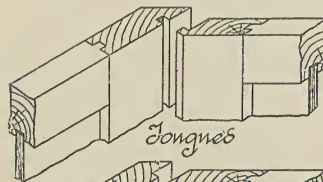


Plan

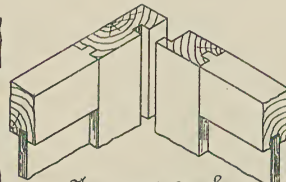
Note: All stuff to be out of the dimensions figured



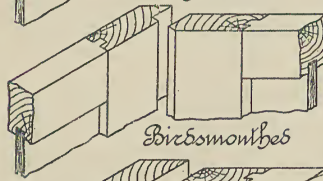
Sketch showing fixing



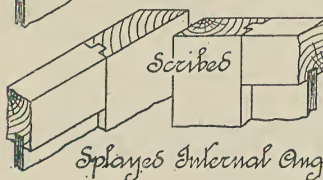
Tongues



Tongues Angle (internal)

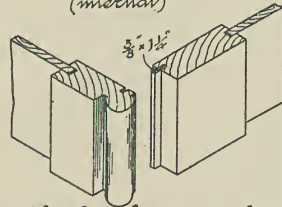


Dovetails

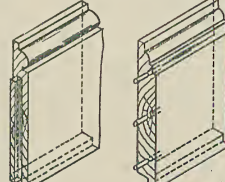


Scribed

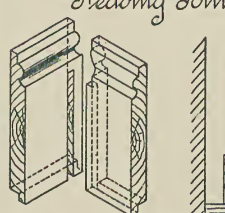
Splayed Internal Angles



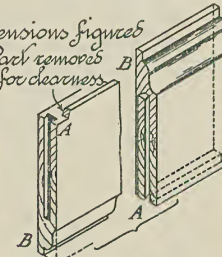
Dovetail, Tongues & staff - beaded angle (external)



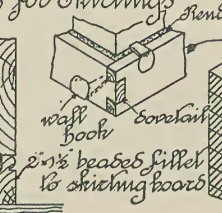
Tongues Dovetails



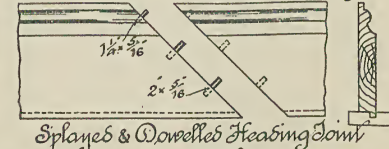
Tongues & scribed



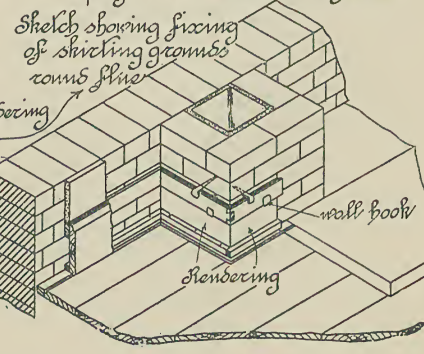
Dovetail Tongues



Dovetail



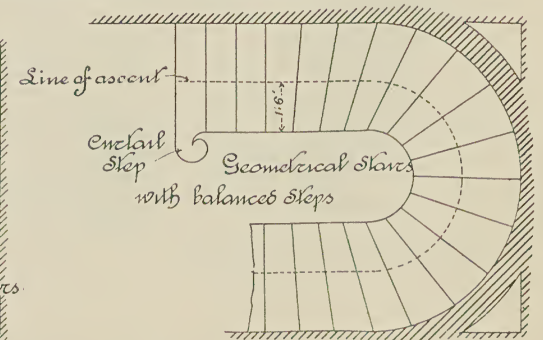
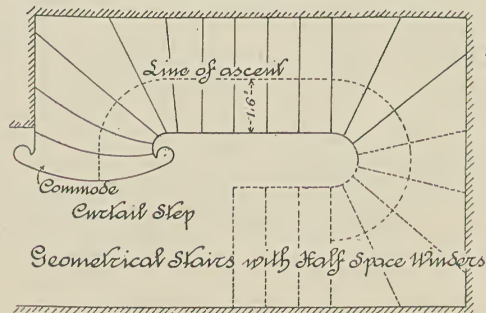
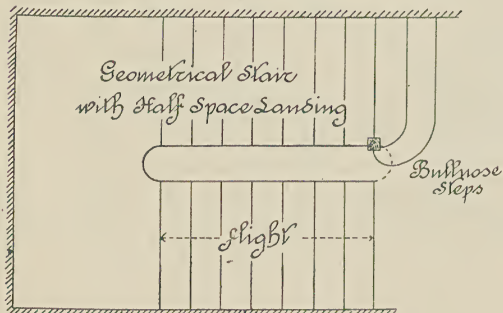
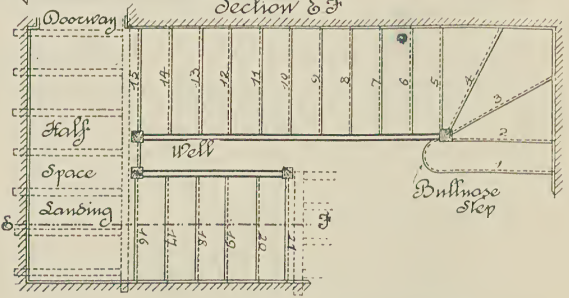
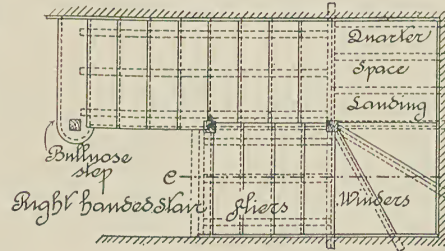
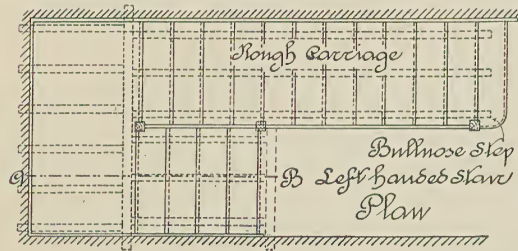
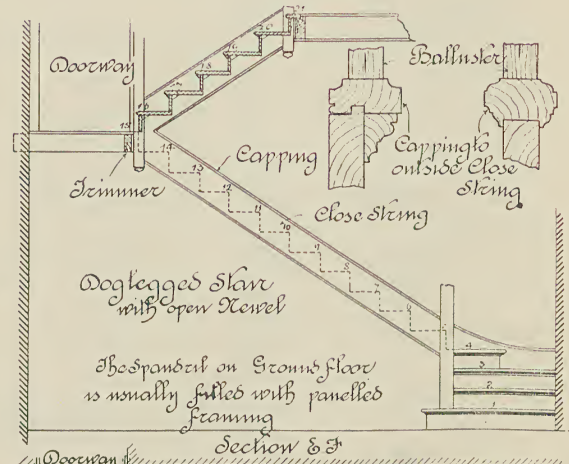
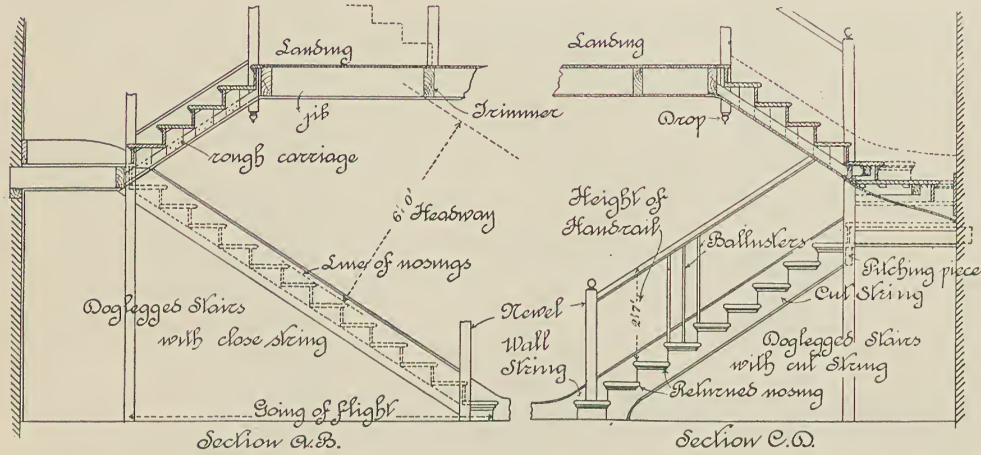
Splayed & Dovetail Heading Joint



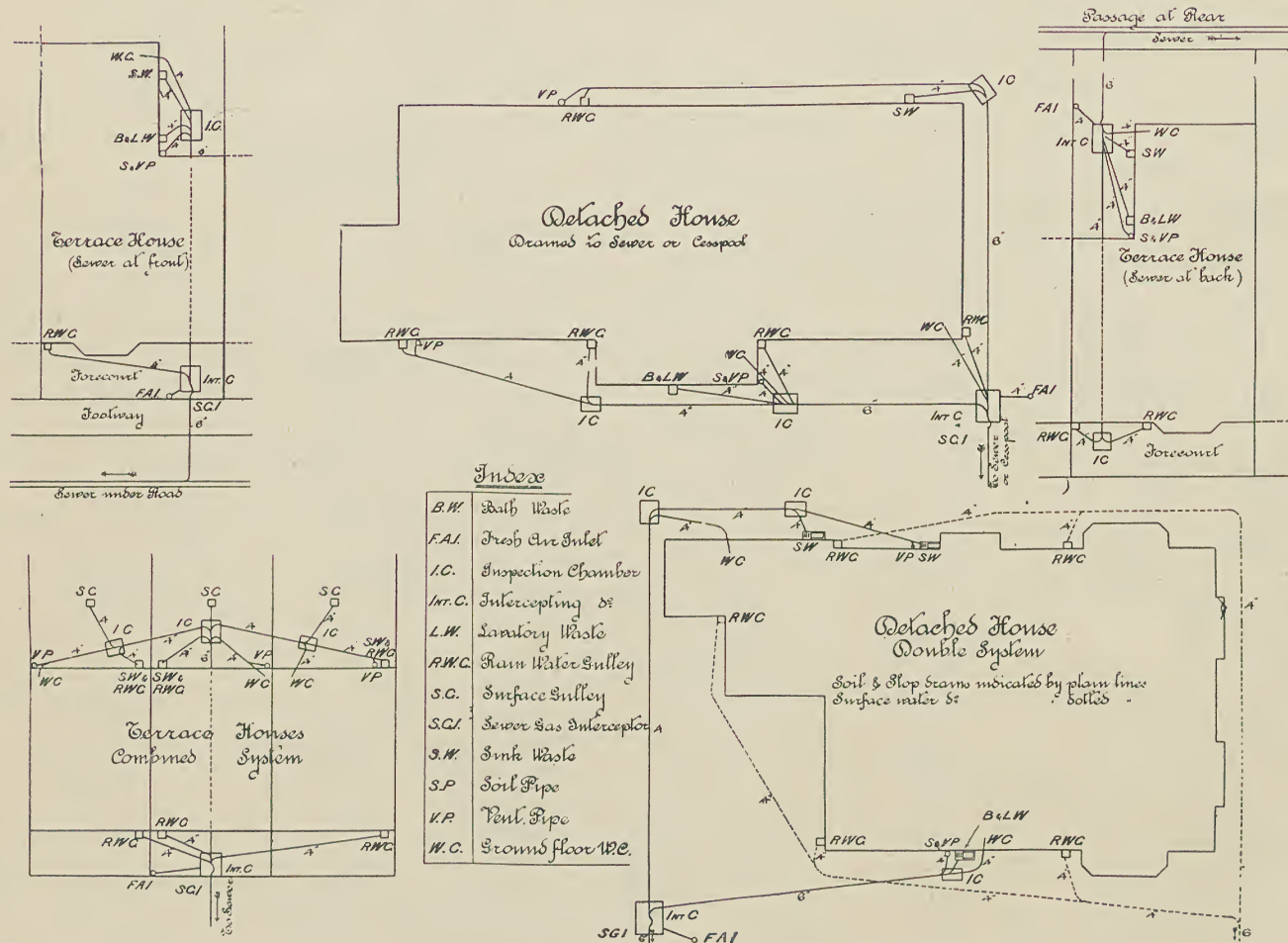
Rendering

PLATE 79.

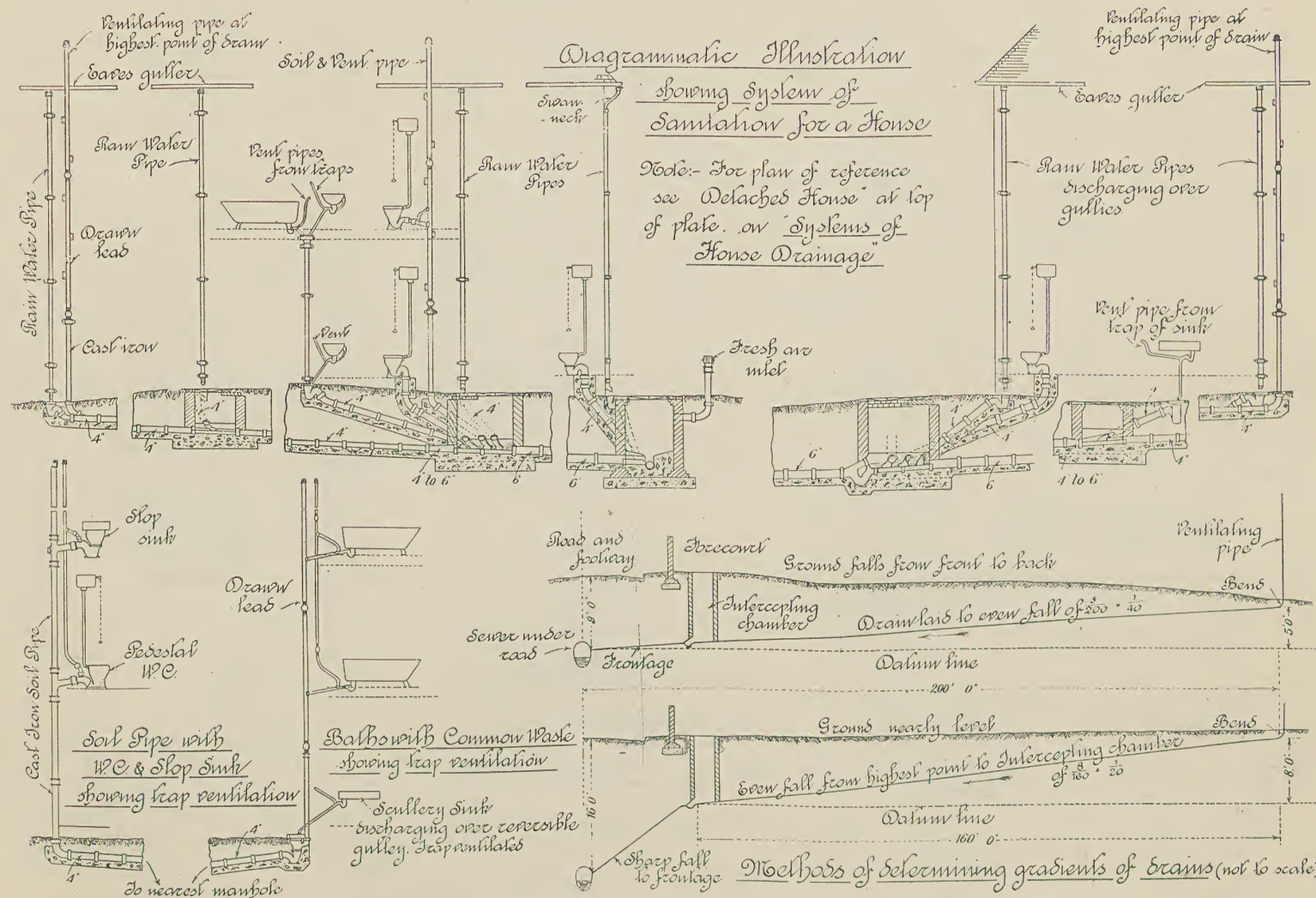
STAIRS.



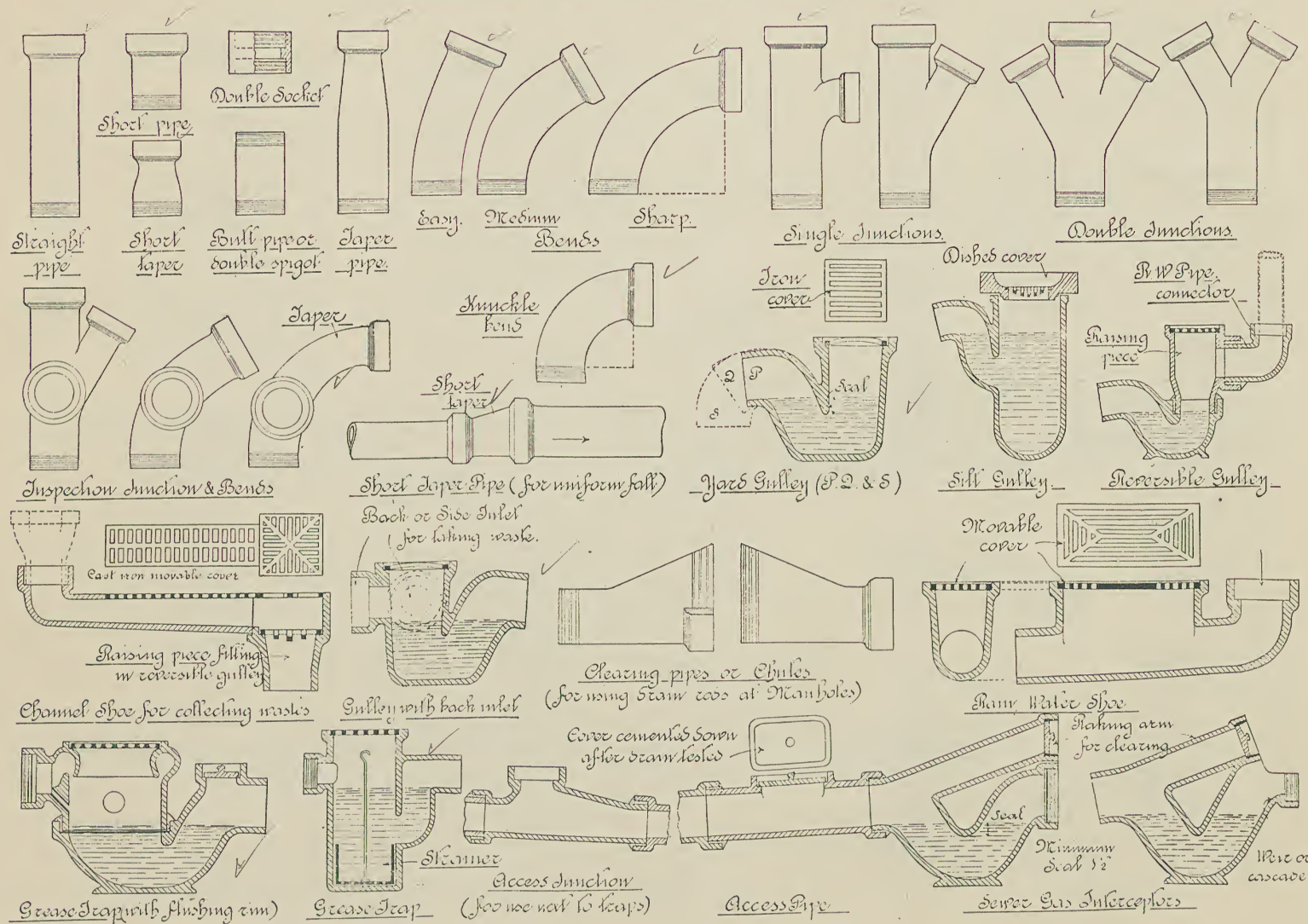
SYSTEMS OF HOUSE DRAINAGE.



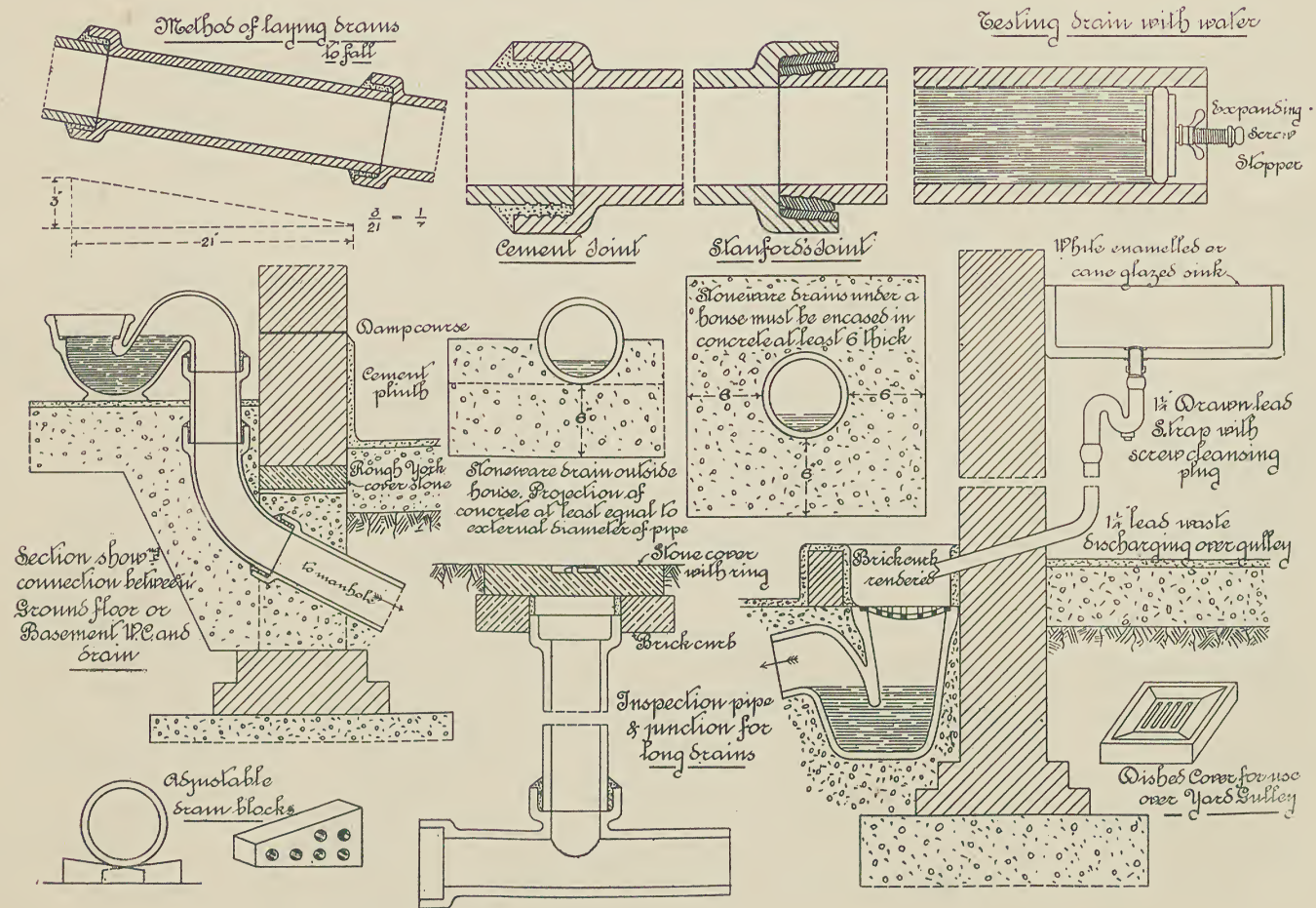
DRAIN CONNECTIONS—HOUSE TO SEWERS.



STONEWARE DRAIN PIPES AND TRAPS.

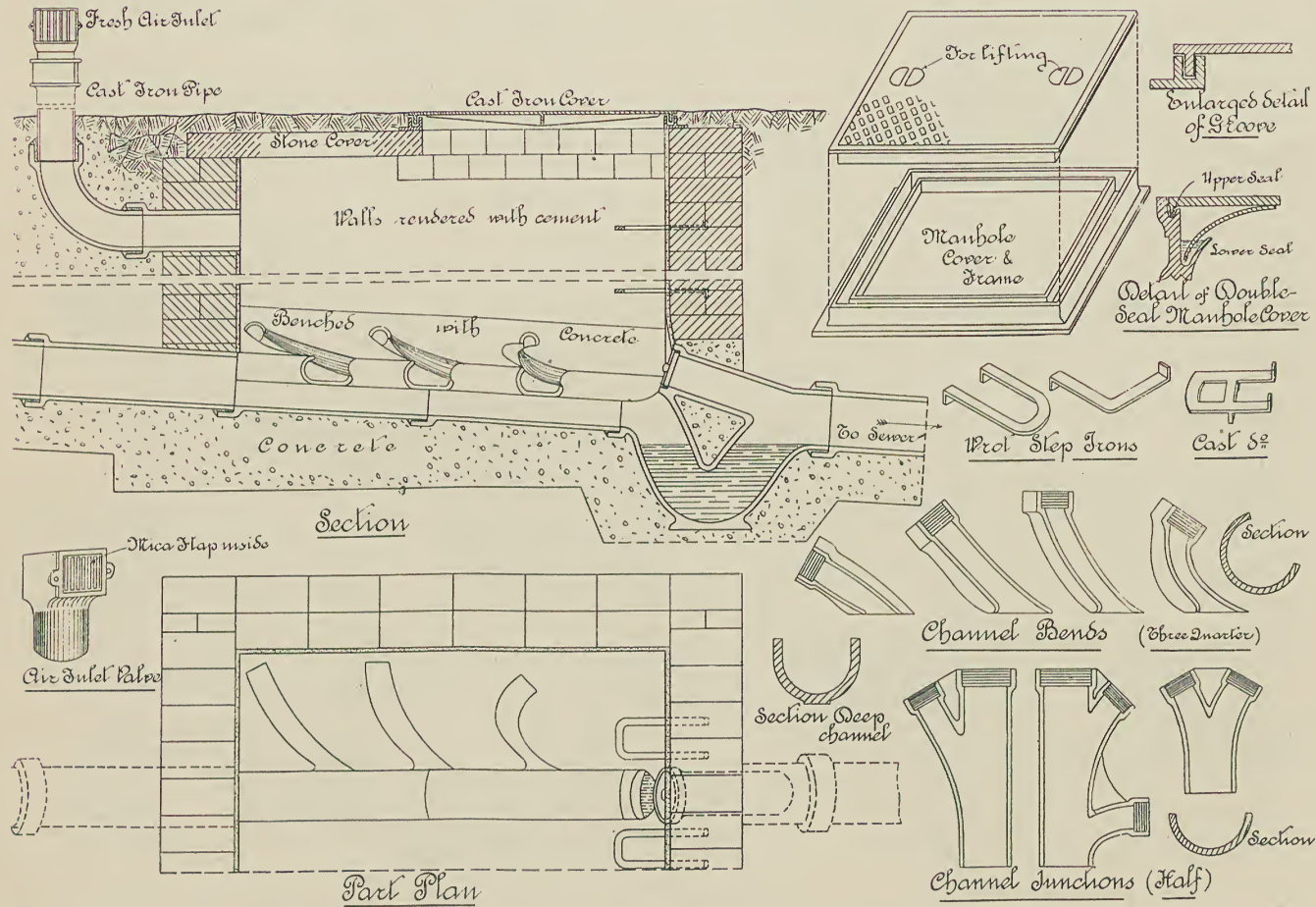


DRAIN-LAYING DETAILS.

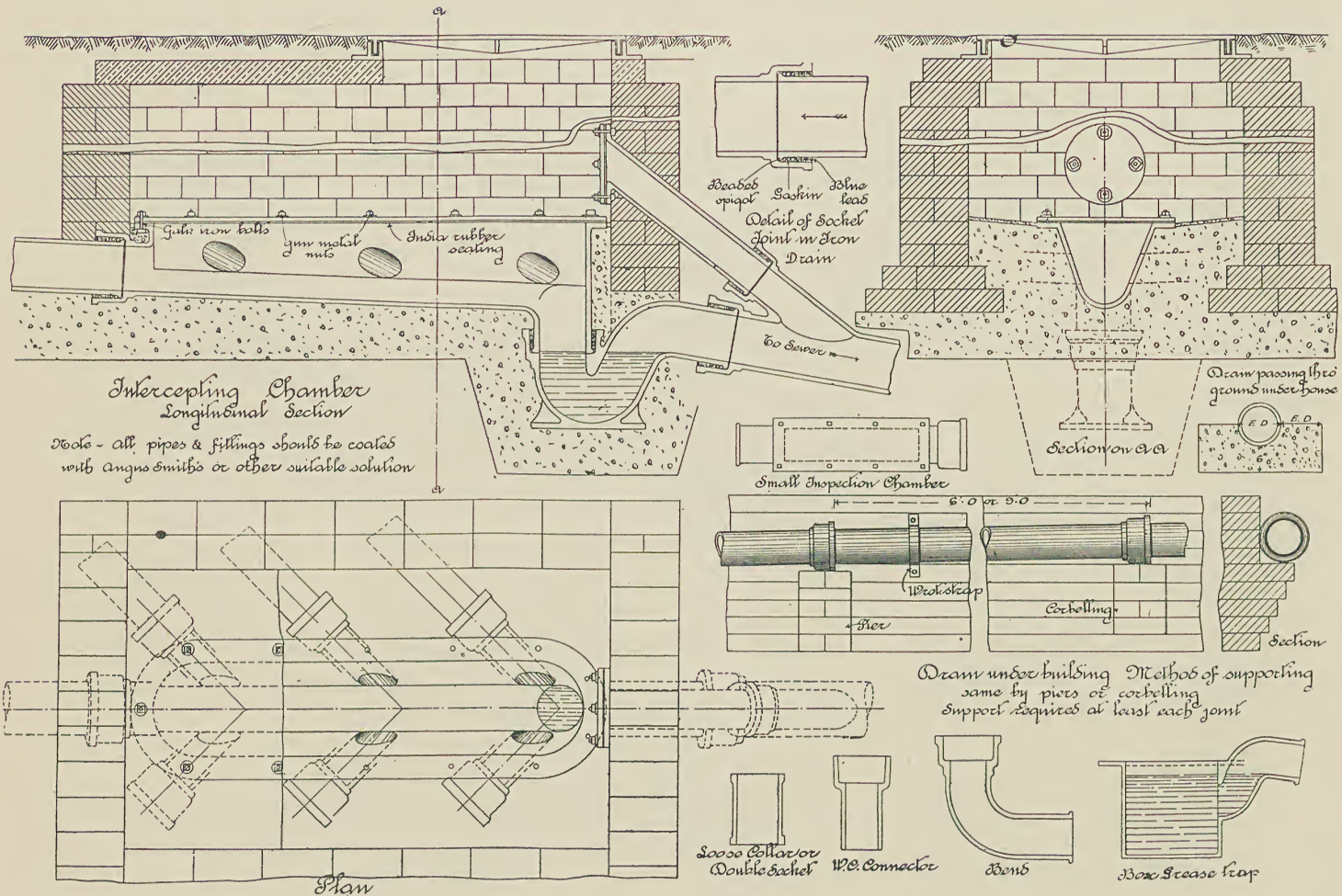




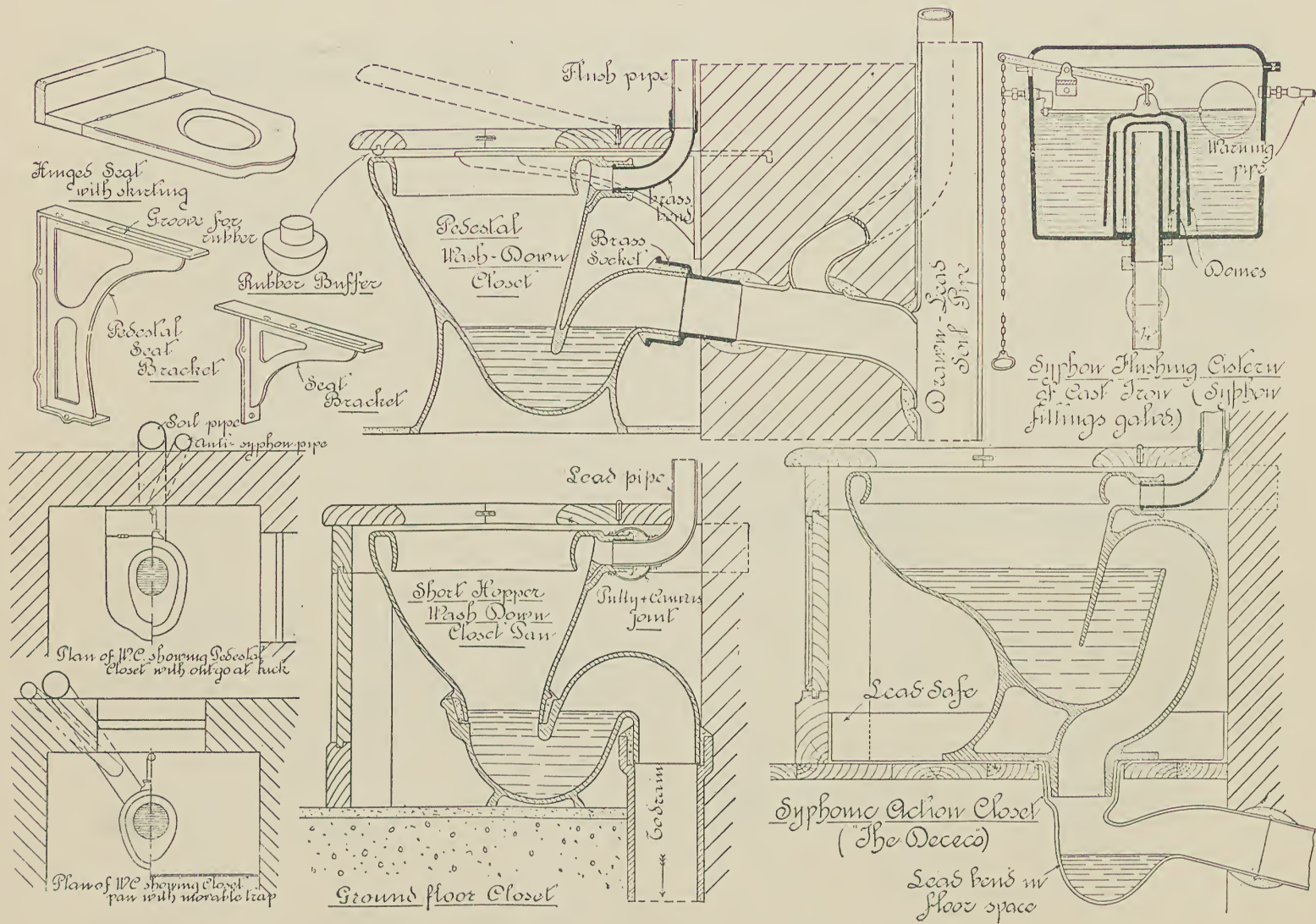
INTERCEPTING CHAMBER.



CAST IRON DRAINS.



WATER CLOSETS AND FITTINGS.



VALVE CLOSET AND SLOP SINKS.

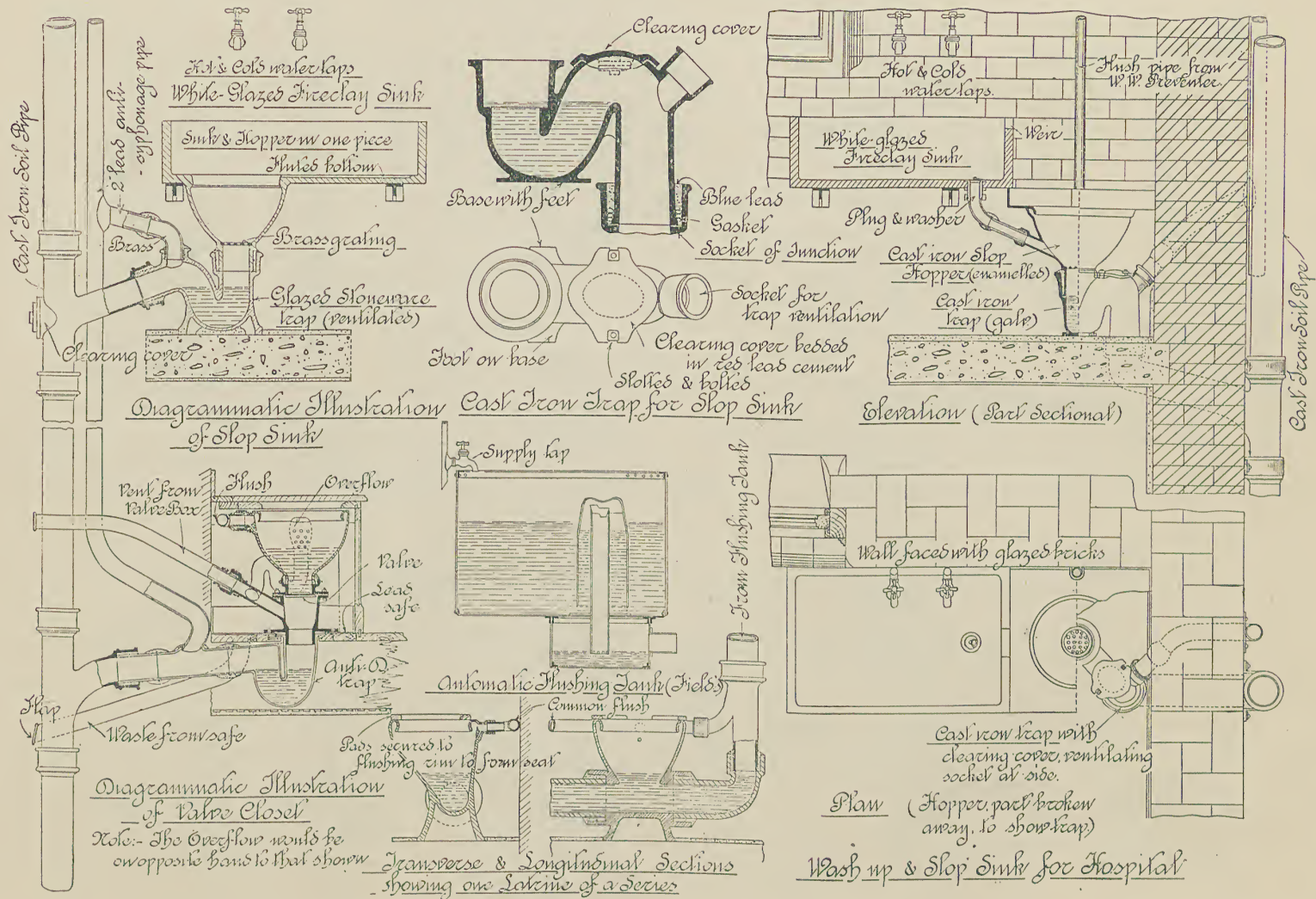
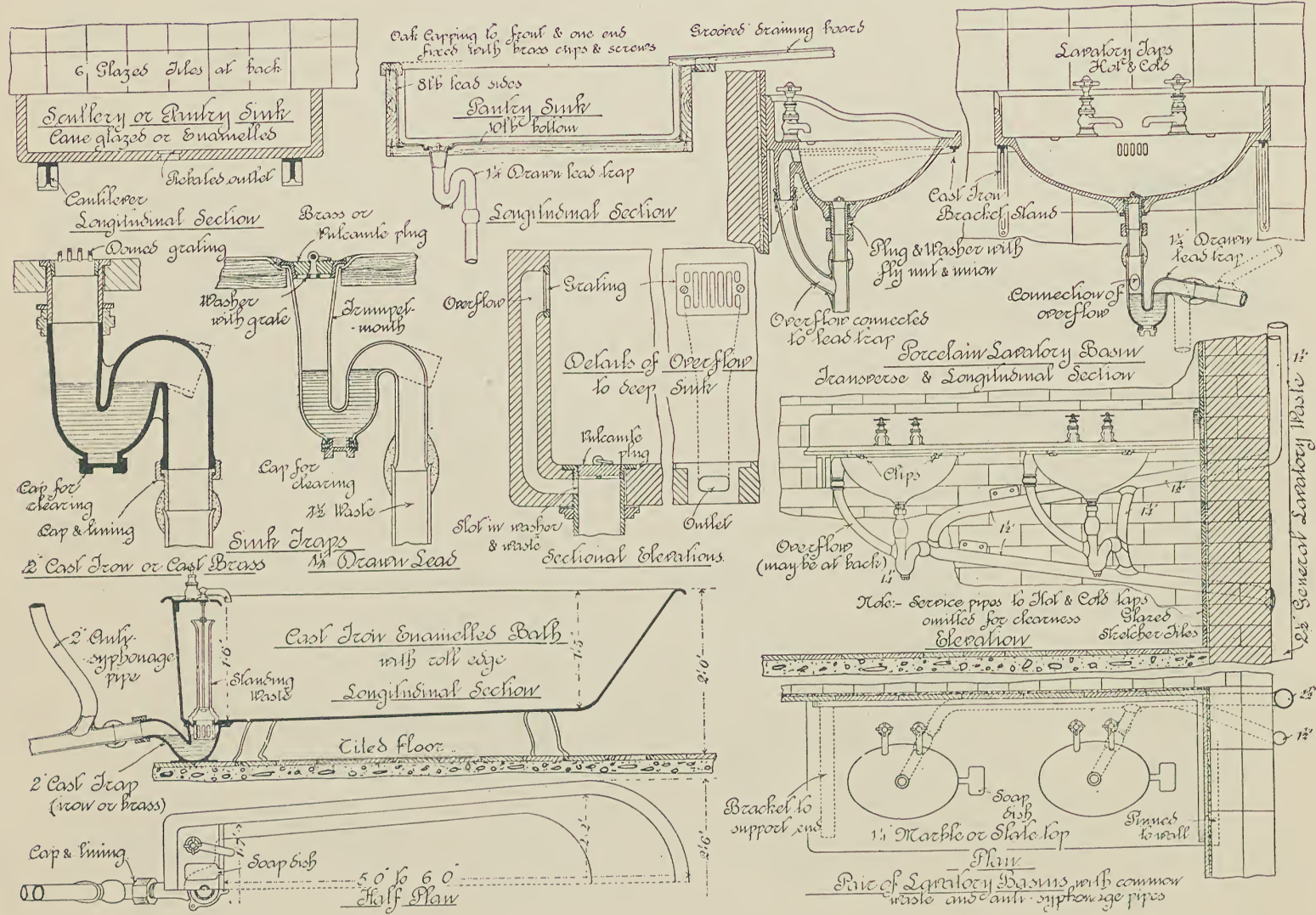
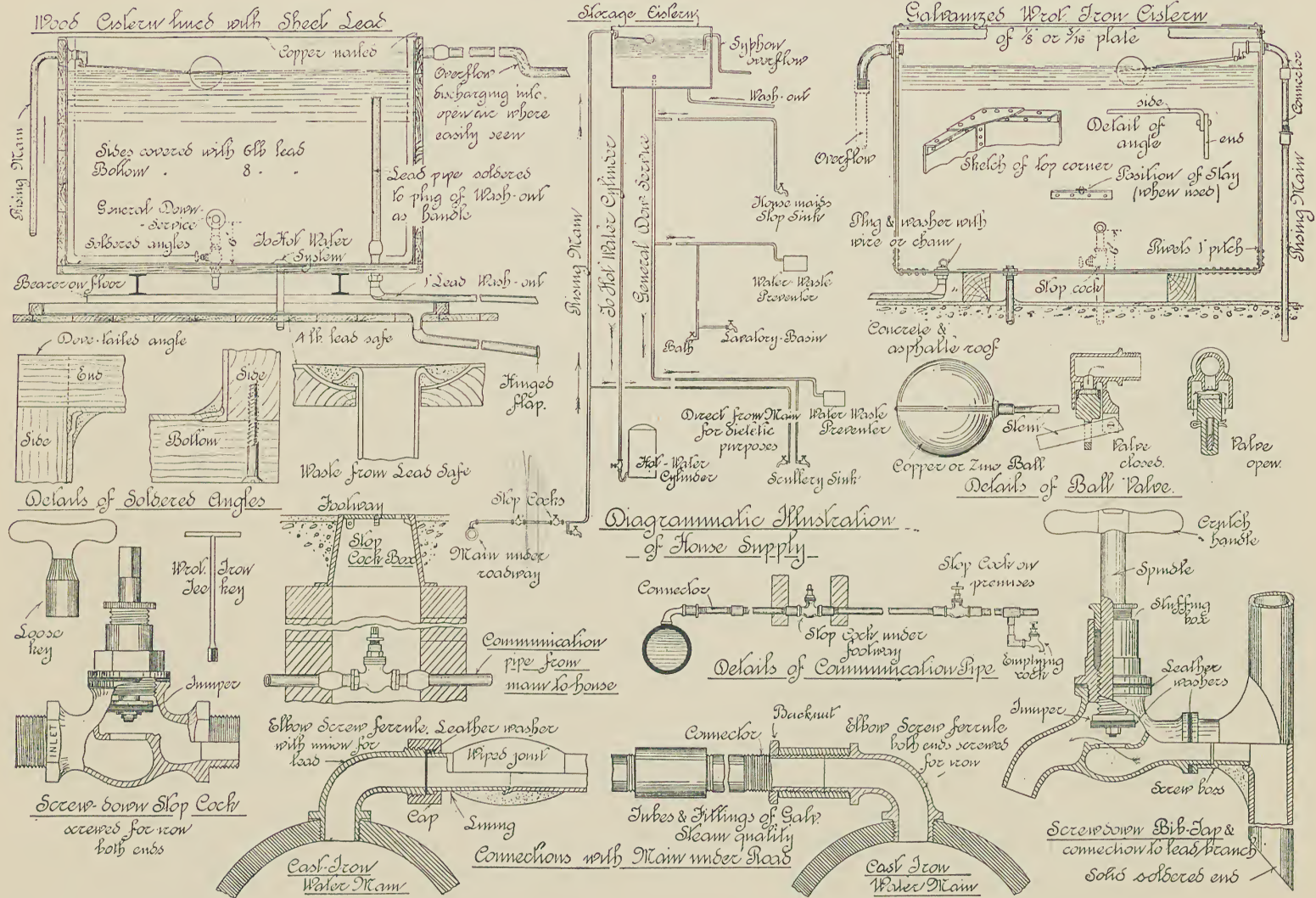


PLATE 90.

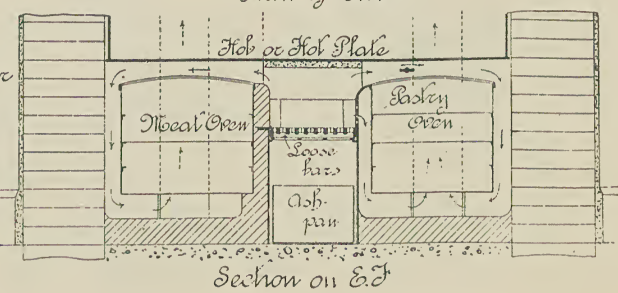
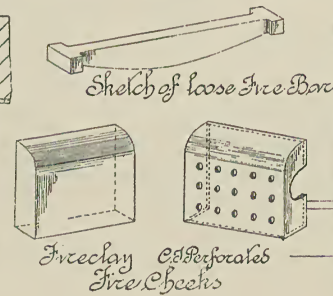
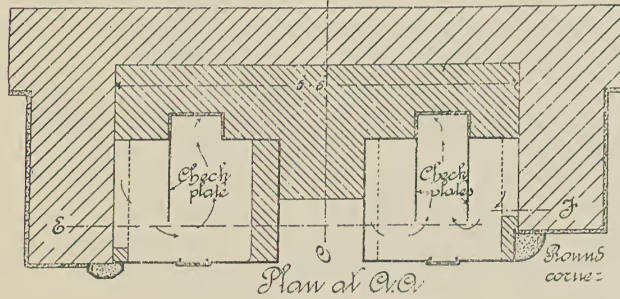
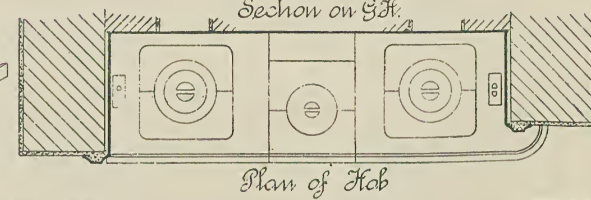
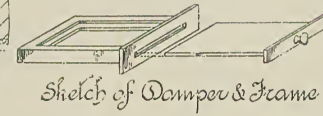
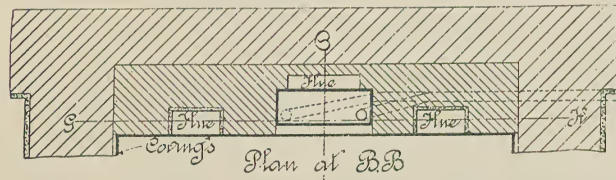
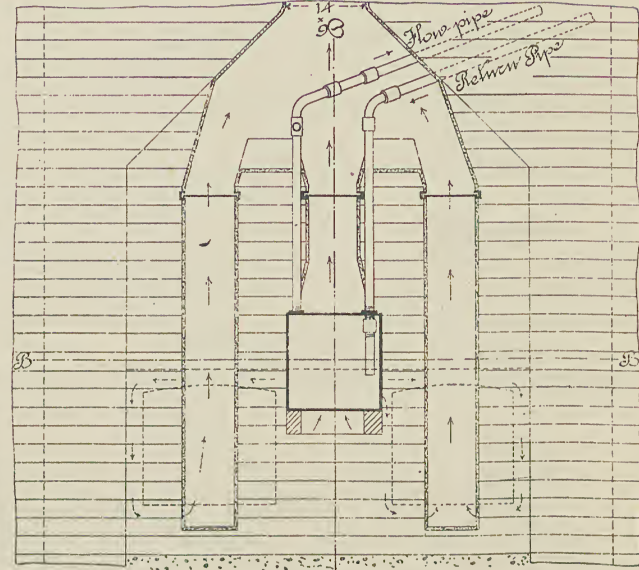
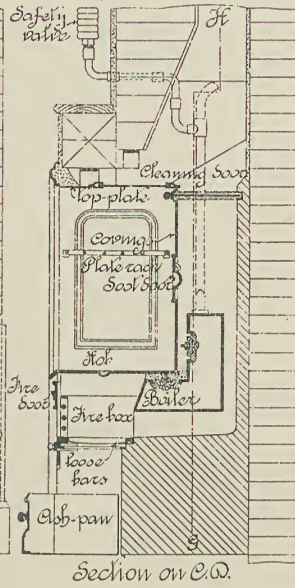
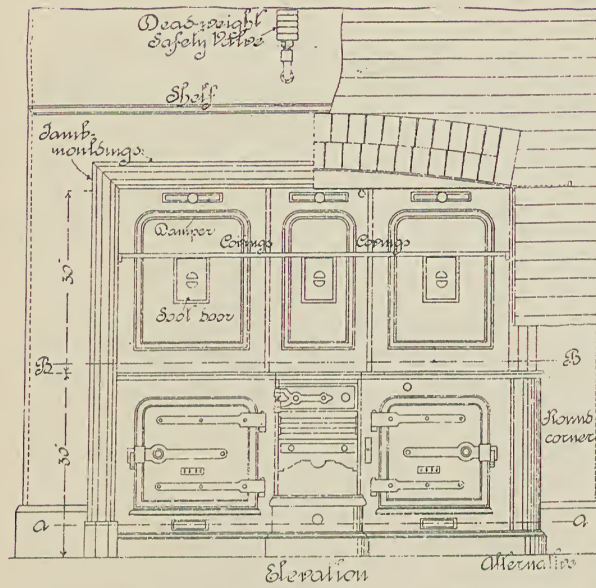
BATH, LAVATORY BASINS AND SINKS.



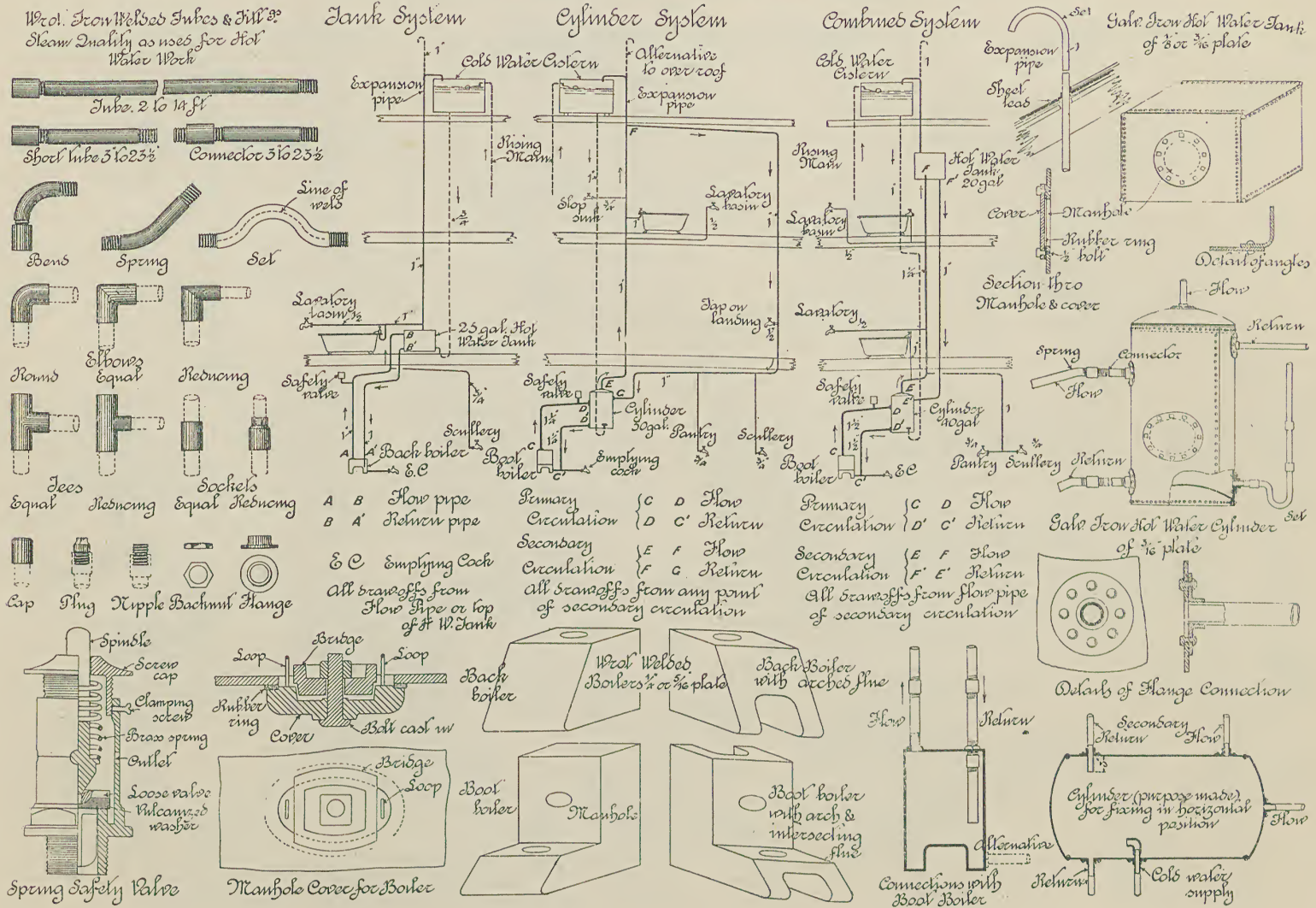
COLD WATER SUPPLY TO BUILDINGS.



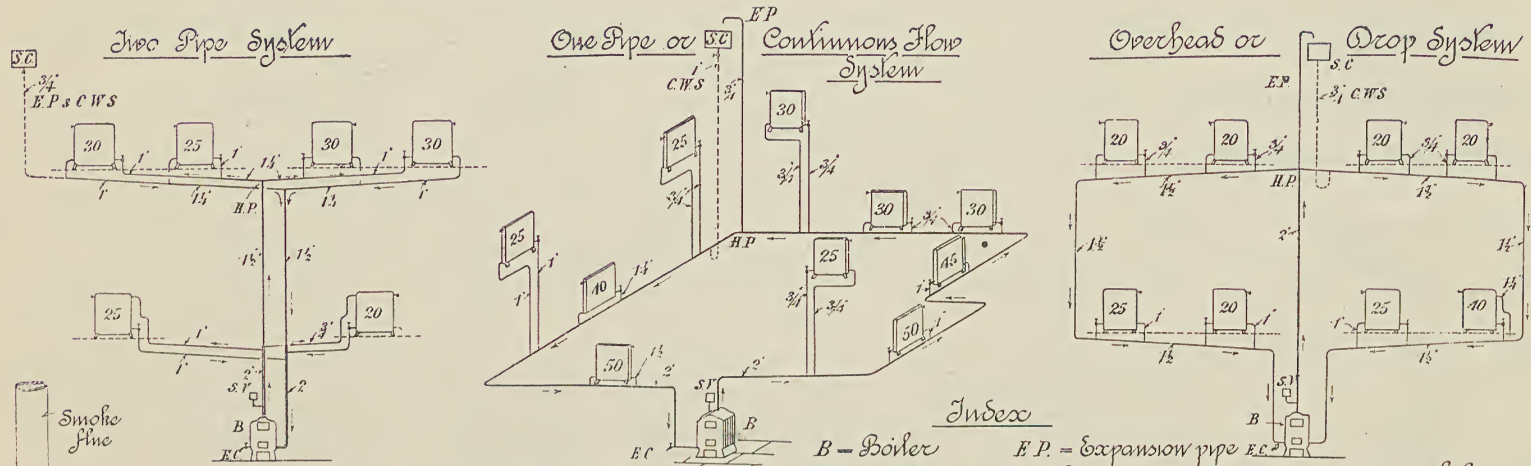
KITCHENER WITH BOILER.



HOT WATER SUPPLY (DOMESTIC).



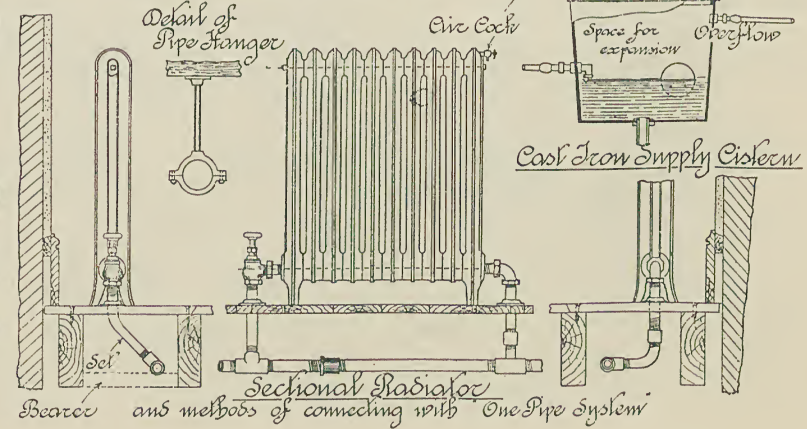
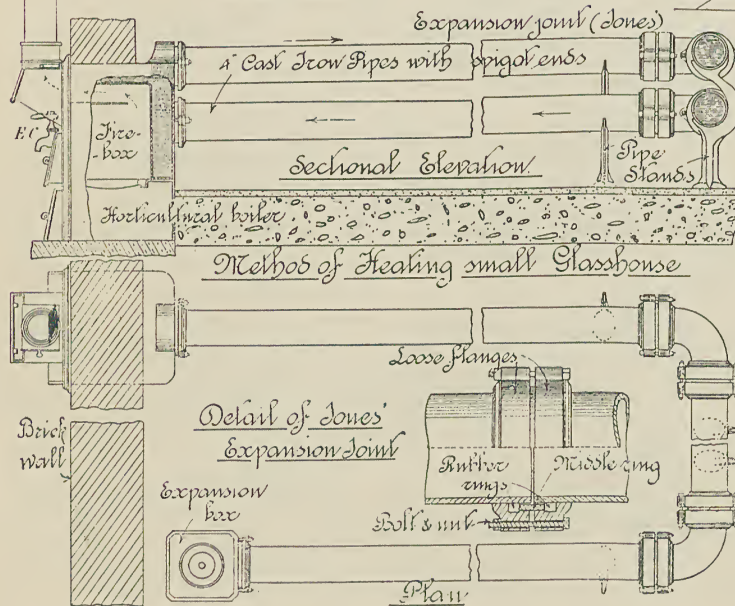
HOT WATER HEATING, LOW PRESSURE SYSTEMS.



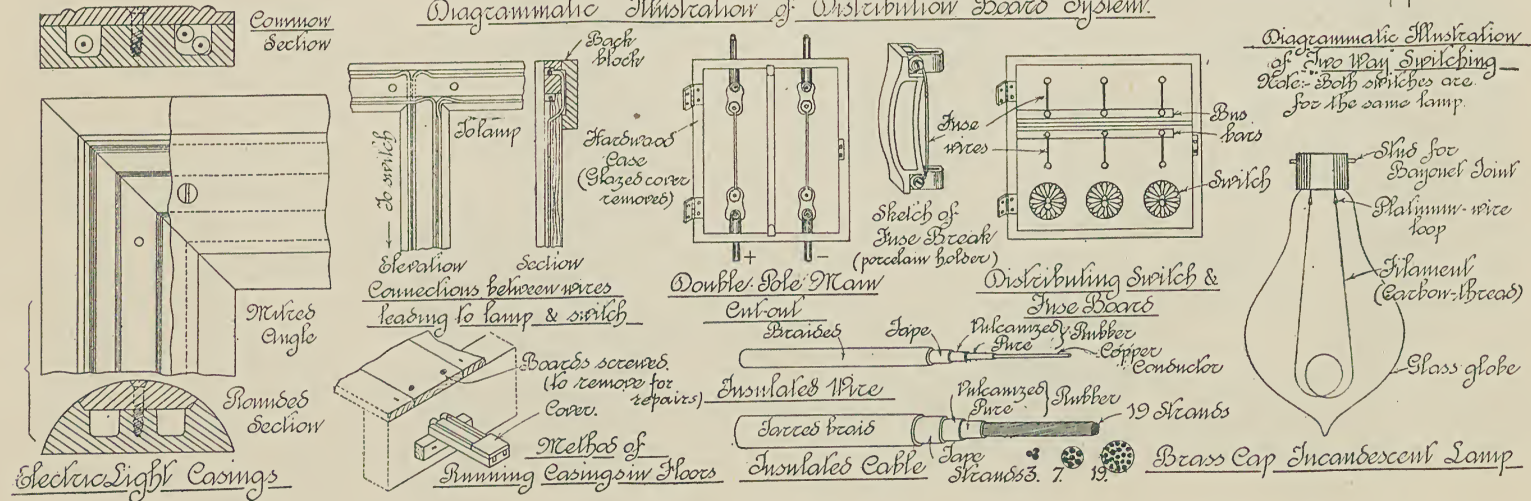
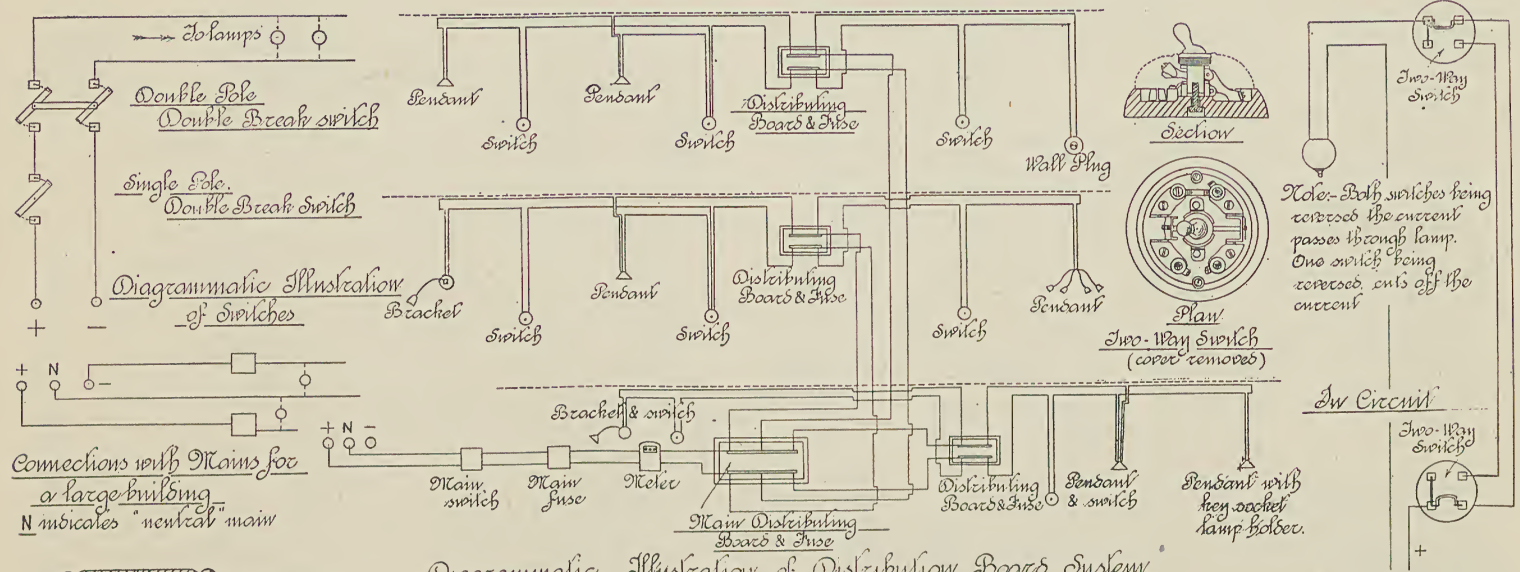
Index

- B - Boiler
 C.W.S. - Cold water supply
 E.C. - Emptying cock
 H.P. - Highest point of main circulation
 E.P. - Expansion pipe
 S.C. - Supply cistern
 S.F. - Safety valve

Note: The figures on Radiators indicate their radiating surface in square feet.



ELECTRIC LIGHTING.



CAST IRON COLUMNS AND STANCHIONS—BASES.

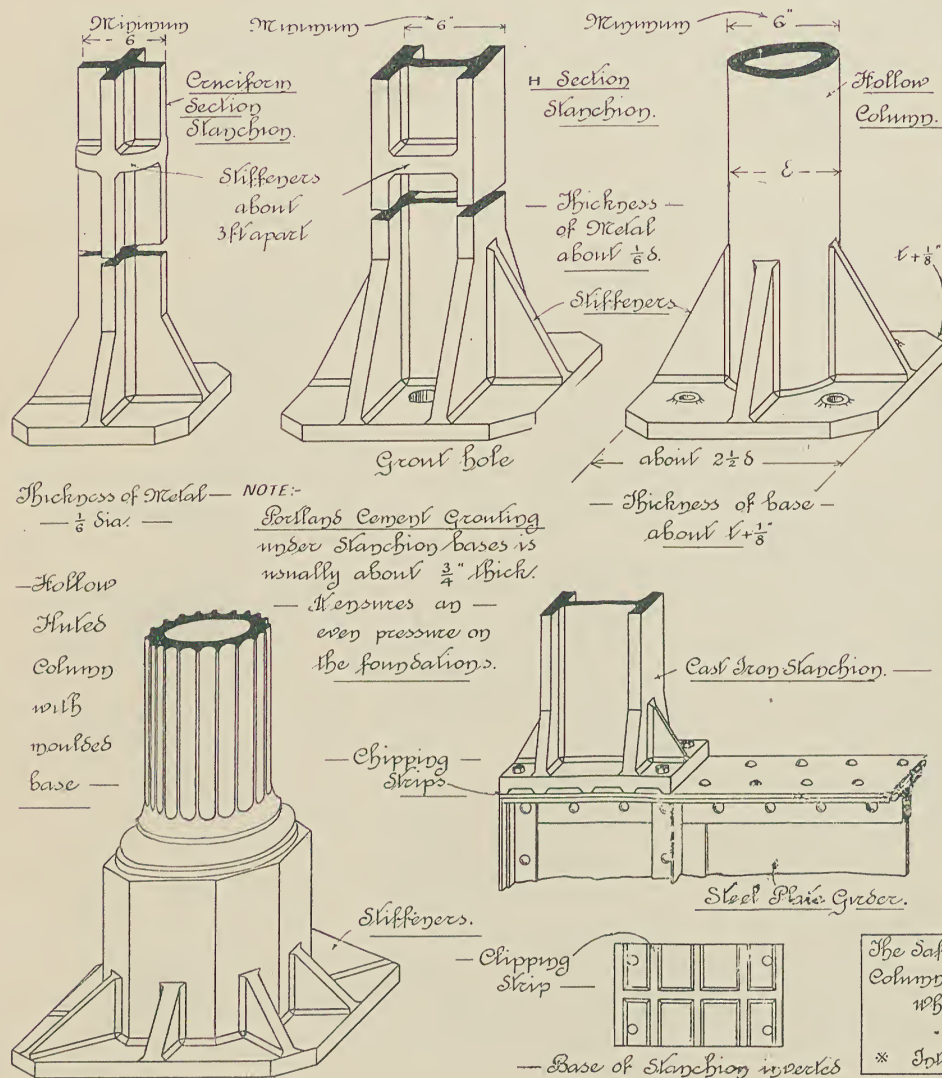










Table of Approximate relative strengths of Cast Iron
Stranchions with unfixed ends. (pin ends)
Supporting dead load.

SECTION	RELATIVE STRENGTHS		FACTORS OF SAFETY.	RELATIVE WORKING VALUES		REMARKS
	EQUAL SIDES "d"	EQUAL AREAS		EQUAL SIDES "d"	EQUAL AREAS	
 d	2.50	.98	8	1.88	.74	Not used except for small slingshots or very light loads.
 d	1.70	1.0	8	1.27	.75	
 d $t = \frac{1}{8} d$	1.68	1.19	10	1.00	.71	High F.S. as whole of material cannot be inspected. Core is likely to float. Used for heavy work & where appearance must be studied.
 d $t = \frac{1}{8} d$	1.29	1.21	10	.77	.72	
 d $t = \frac{1}{8} d$	1	1	6	1	1	Best Practical Section. Low F.S. Whole surface can be inspected, easy connections
 d $t = \frac{1}{8} d$.58	.86	6	.57	.86	Good for lighter loads than 
 d $t = \frac{1}{8} d$	1.04	.76	10	.62	.46	Not to be used unless Section is best suited for structural purposes. High F.S. High internal stress is set up when casting is cooling.

Method of Tuning	approximate relative value of a column of equal length area sect.
With ends fixed. - - - - -	1.00
One end fixed, one pin. - - - - -	.83
Both ends pin - - - - -	.70

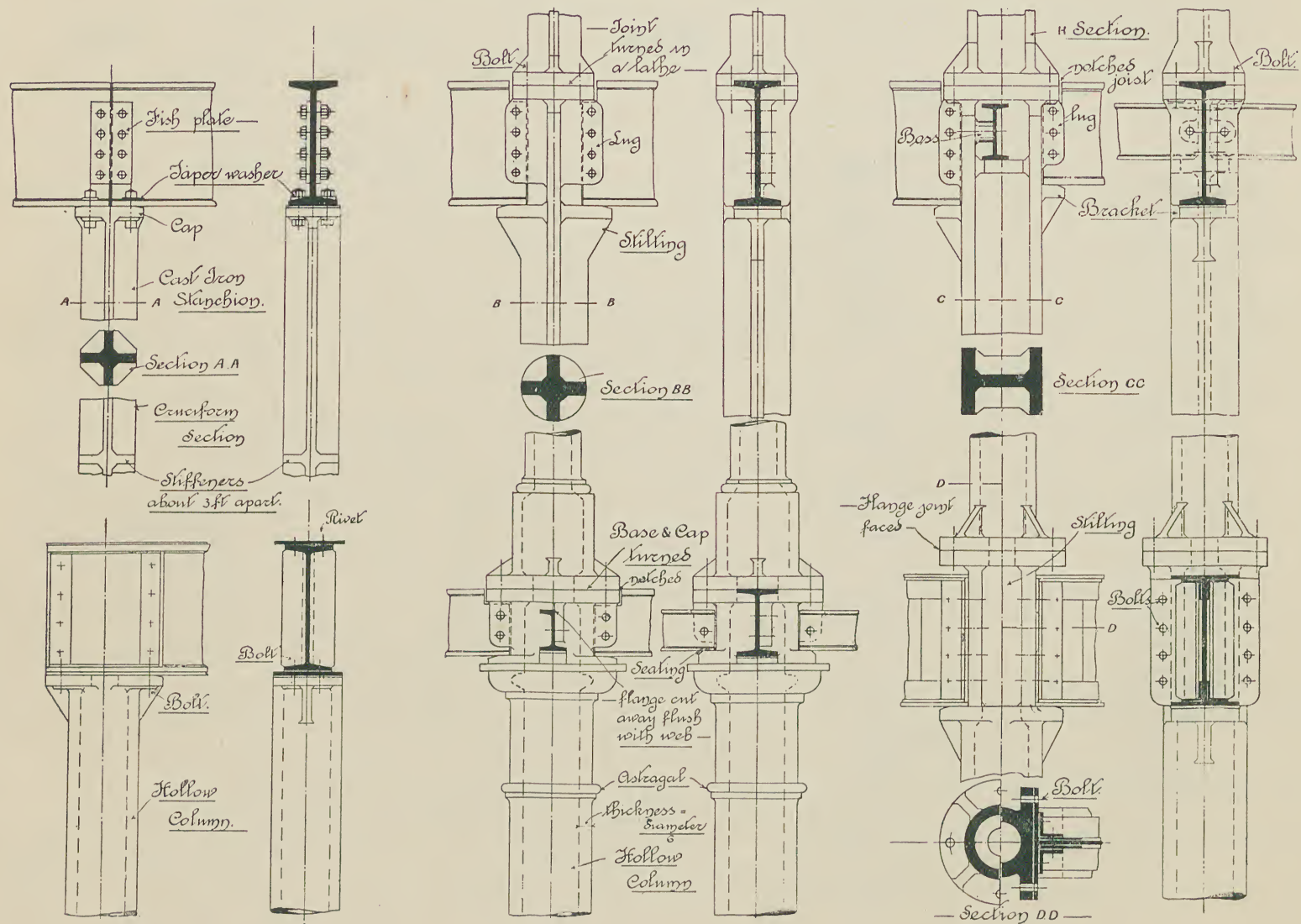
The safe load per sq.in of section decreases as the length of the column increases. i.e.

When length = 8.10	Safe load is about 4 tons per sq.inch.	}	*
8.20			

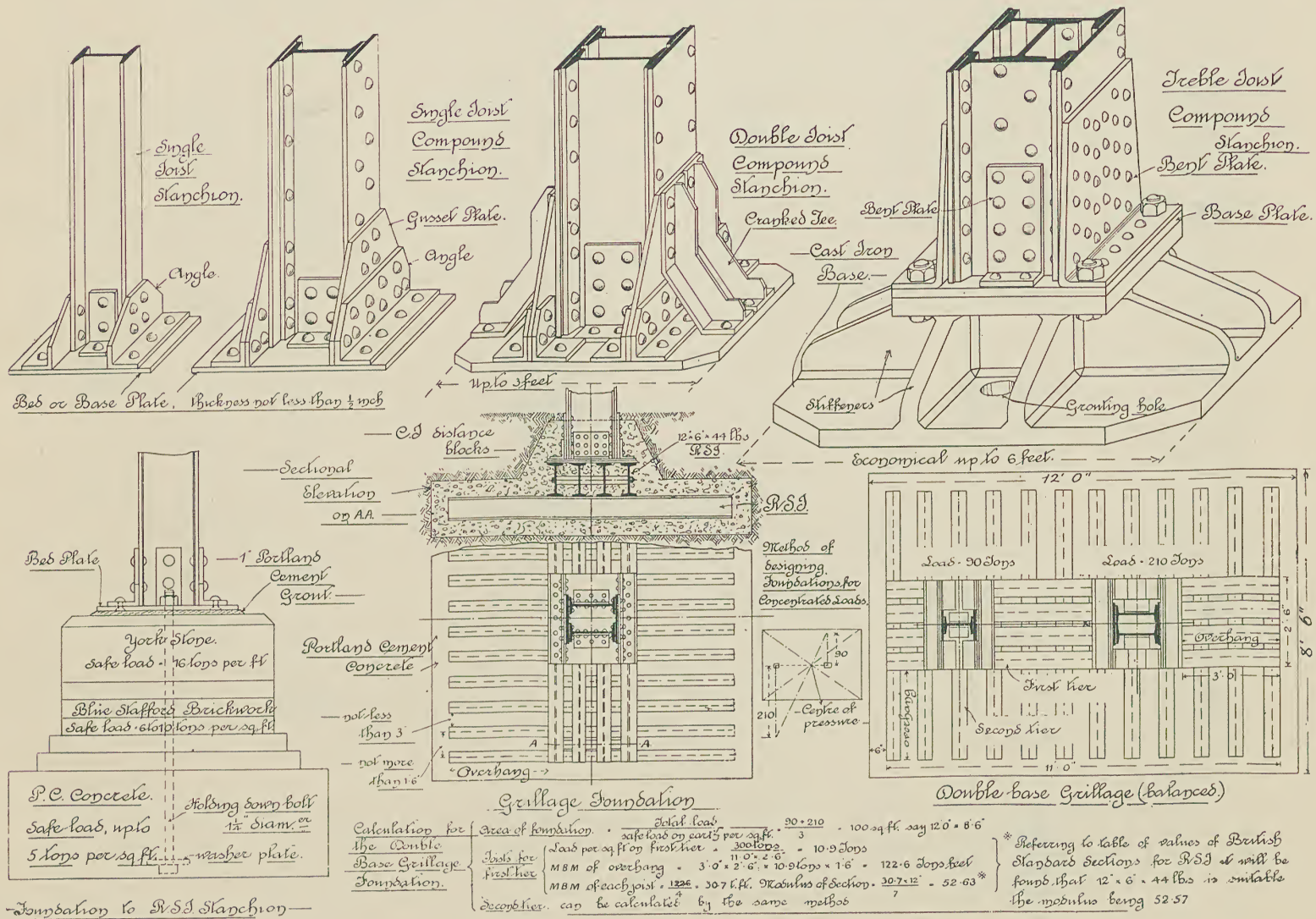
* Intermediate values are in proportion.

PLATE 98.

CAST IRON COLUMNS AND STANCHIONS—CAPS AND CONNECTIONS.



STEEL STANCHIONS—BASES AND FOUNDATIONS.



STEEL STANCHIONS—CAPS AND GIRDER CONNECTIONS.

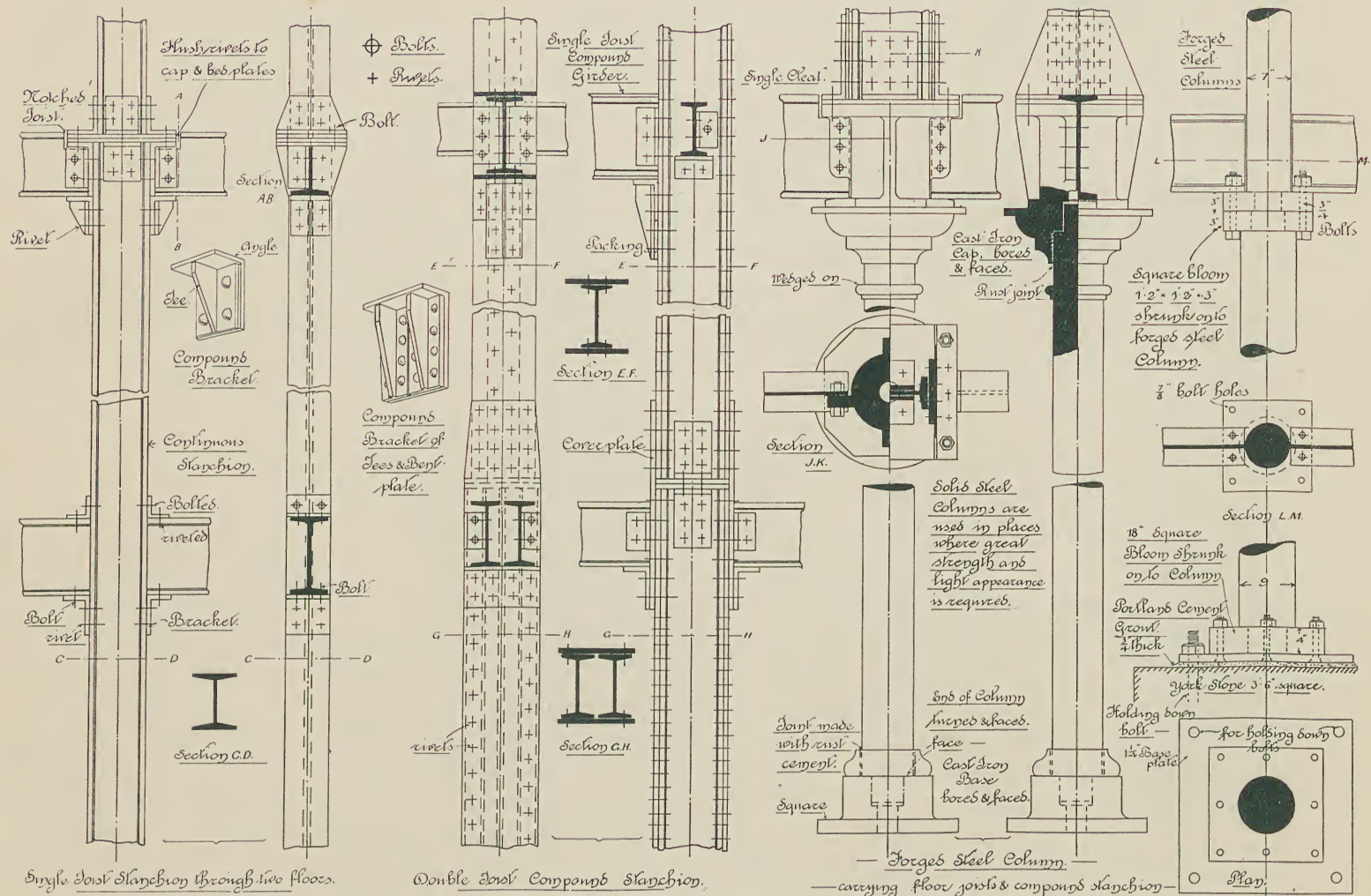


PLATE 101.

STEEL JOISTS, &c., SECTIONS AND JOINTS.

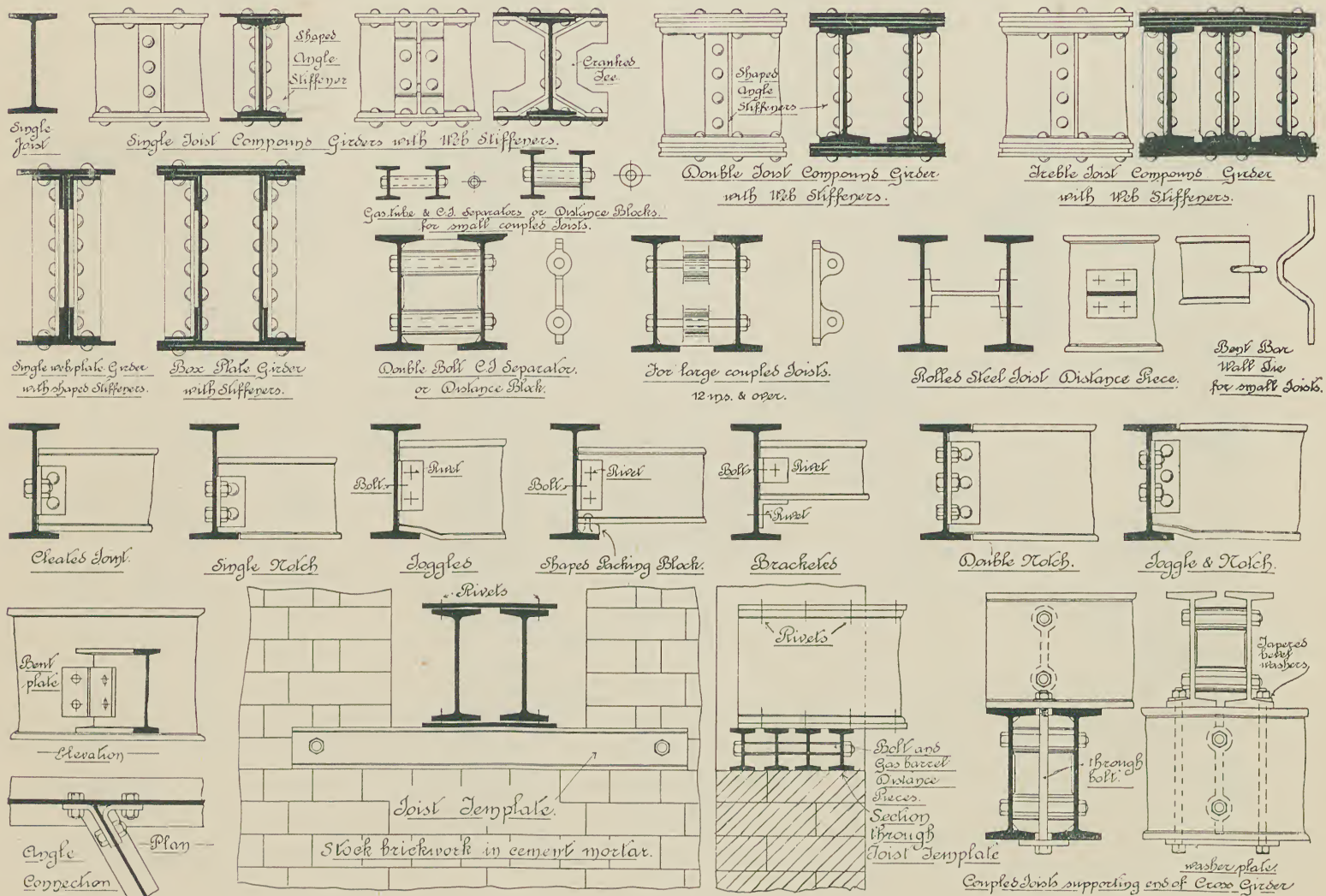


PLATE 102.

FORMULÆ AND DIAGRAMMS FOR BEAMS.

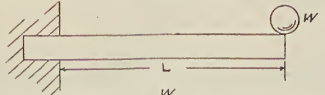


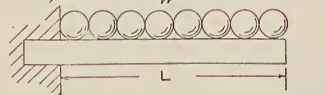


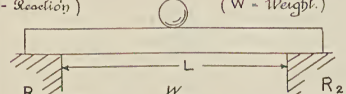


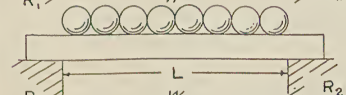

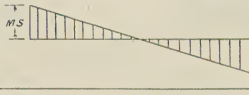
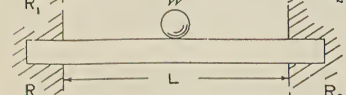
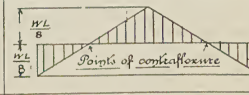

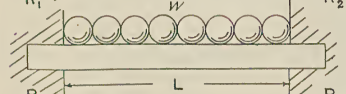
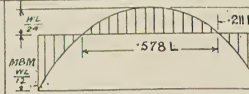
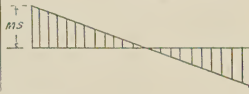
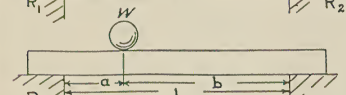

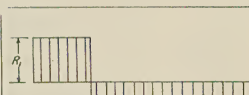
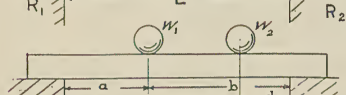

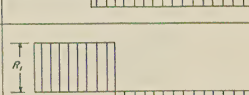
Method of Loading.	Relative Strength.	Maximum Bending Moment.	Bending Moment Diagram.	Max Shear.	Shearing Stress Diagram.	Deflection Δ .	Relative Deflection.
	1	$MBM = WL$		$MS = W$		$\Delta = \frac{WL^3}{3EI}$	16
	2	$MBM = \frac{WL^2}{2}$		$MS = W$		$\Delta = \frac{WL^3}{8EI}$	6
	4	$MBM = \frac{WL}{4}$		$MS = \frac{W}{2} \cdot R_1 \cdot R_2$		$\Delta = \frac{WL^3}{48EI}$	1
	8	$MBM = \frac{WL}{8}$		$MS = \frac{W}{2} \cdot R_1 \cdot R_2$		$\Delta = \frac{WL^3 \times 5}{48EI \times 8}$	$\frac{5}{8}$
	8	$MBM = \frac{WL}{8}$		$MS = \frac{W}{2} \cdot R_1 \cdot R_2$		$\Delta = \frac{WL^3}{192EI}$	$\frac{1}{4}$
	12	$MBM = \frac{WL}{12}$		$MS = \frac{W}{2} \cdot R_1 \cdot R_2$		$\Delta = \frac{WL^3}{384EI}$	$\frac{1}{8}$
		$R_1 = \frac{Wb}{L}$ $R_2 = \frac{Wa}{L}$ $MBM = R_1 \cdot a$ or $R_2 \cdot b$		$MS = R_1$ or R_2 (whichever is the greater value)		W - Total Load. L - Span in in. E - Modulus of Elasticity I - Moment of Inertia of Beam Average values for "E" for M.S. = 30,000,000. W.I. = 29,000,000. C.I. = 17,000,000.	
		$R_1 = \frac{W_1 b + W_2 d}{L}$ $R_2 = \frac{W_1 a + W_2 c}{L}$ $MBM = R_1 \cdot a$ or $R_2 \cdot d$ (whichever is the greater value.)		$MS = R_1$ or R_2 (whichever is the greater value)			

PLATE 103.

STEEL PLATE GIRDER FOR DISTRIBUTED LOAD.

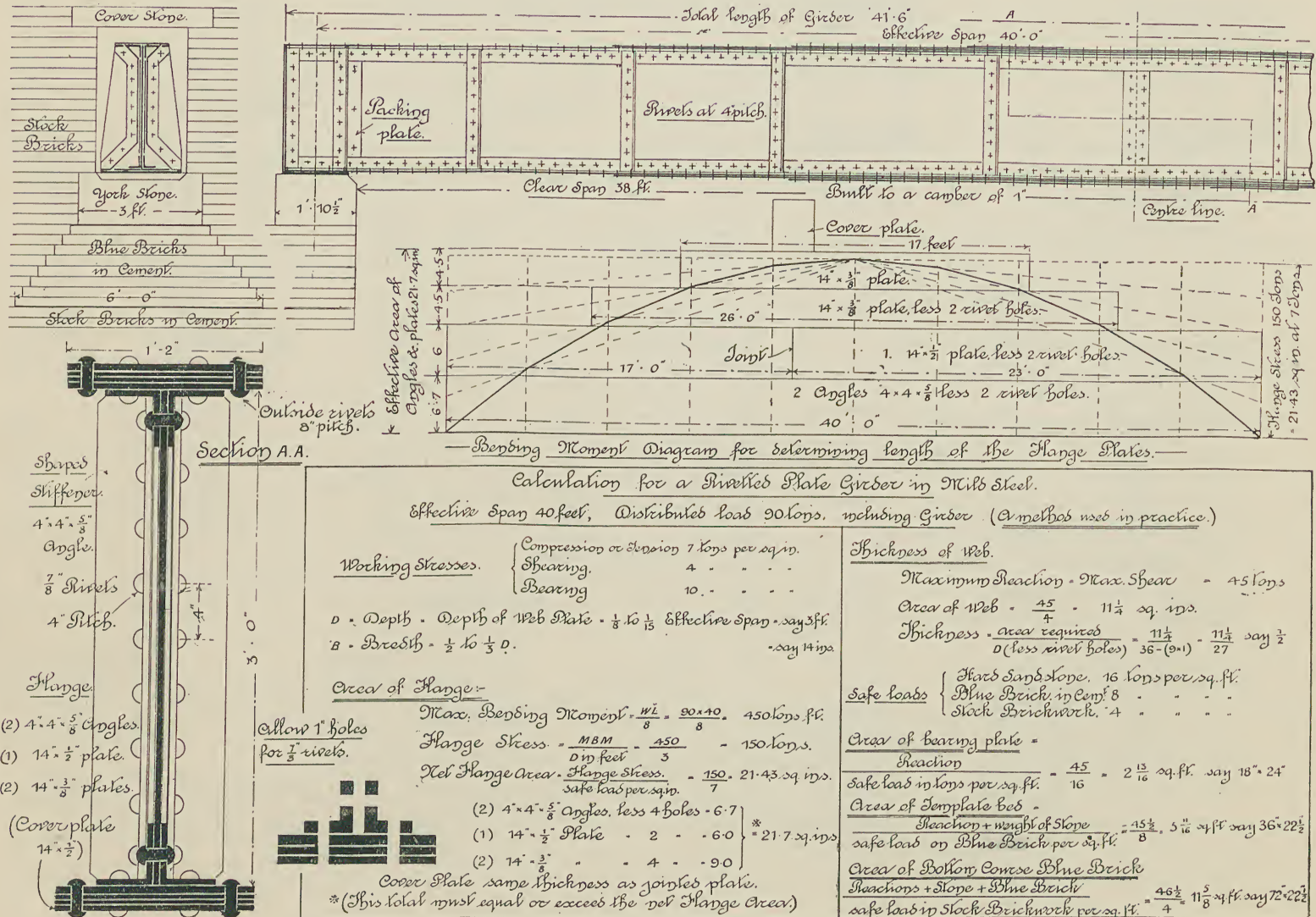
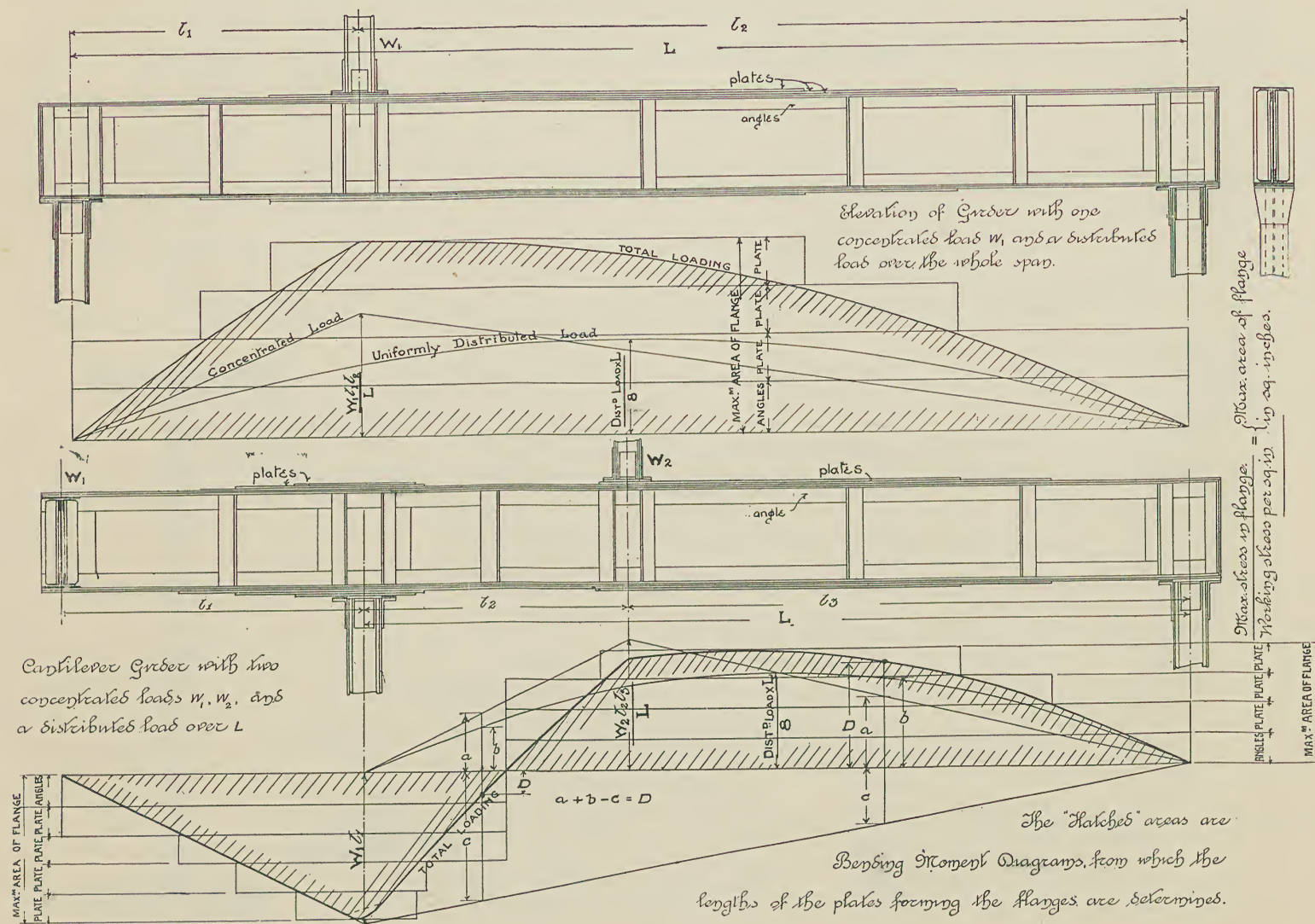


PLATE 104.

STEEL PLATE GIRDERS FOR CONCENTRATED LOADS.



STEEL FRAMING TO FLOORS.

Trade Note:- All bolts through flanges of R.S.J.s to have taper washers. Rivets at all bearings to be complete single ends of all Stanchions to be turned in Lathe before Cap & Base Plates are rivelled on. All rivet holes through flanges to be drilled. All steel to be of British Manufacture.

Labels in the drawing include: Stone facing, Complete joists, Separator, Single End Compound Slab, Portland Cement mortar, Single End Compound Girder, Double Channel Compound Stanchion, Intermediate Joists, Expanded metal wrapped concrete flange for key to plastering, Bracket, Stringer, Cleat bolted to main joist, Cleat, Main Joist, Main Girder, Plate Girder, Semi-bolt to sticking, Complete single rivets in Cap plate, Bolt holes, Single End Compound Stanchion, and about 3 ft. centres.

PLATE 106.

STEEL CONSTRUCTION TO CONCRETE STAIRS.

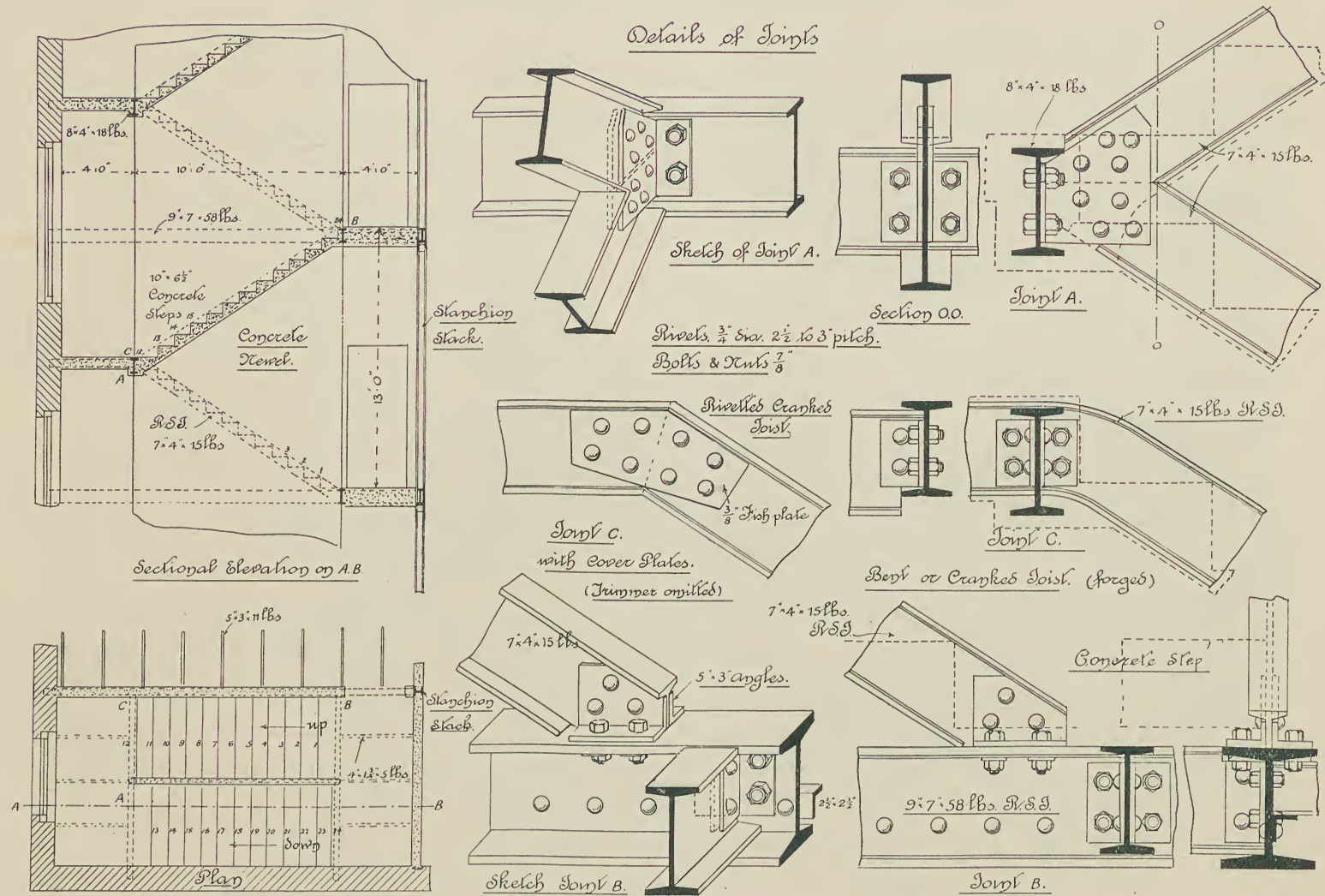
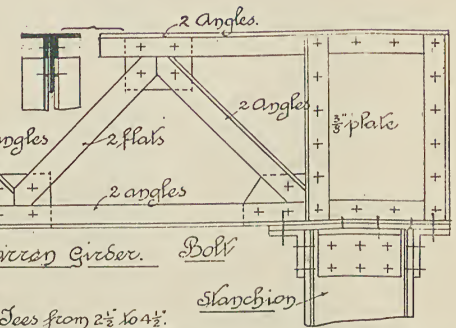
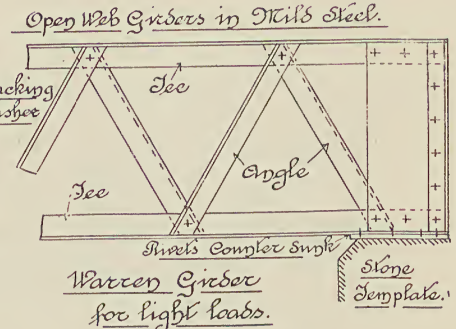
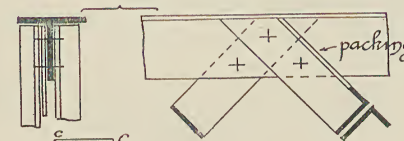
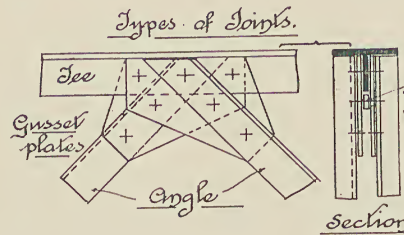
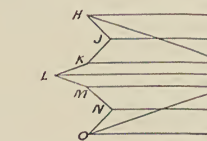
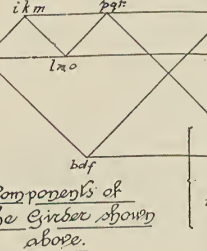
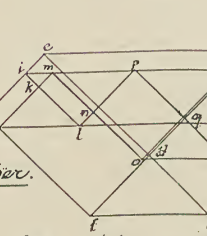
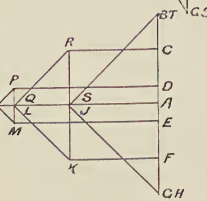
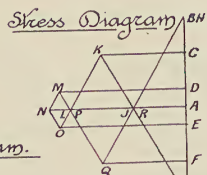
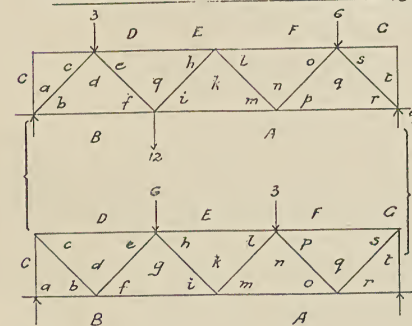
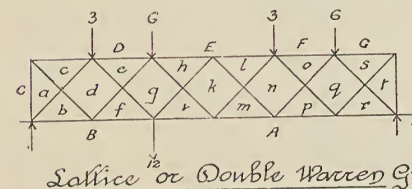
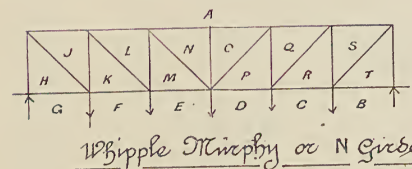
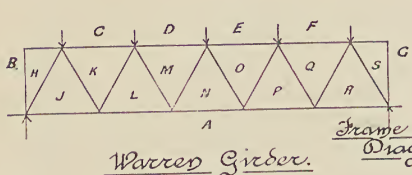
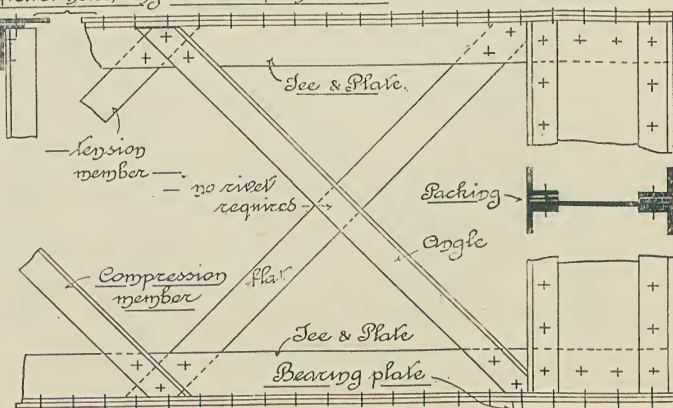


PLATE 107.

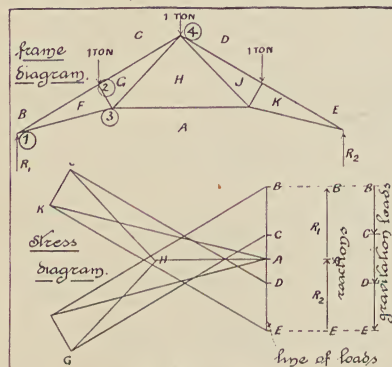
OPEN WEB GIRDERS, STRESS DIAGRAMS, &c.



Position of rivet holes, Angles or Tees from 2 1/2 to 4 1/2.



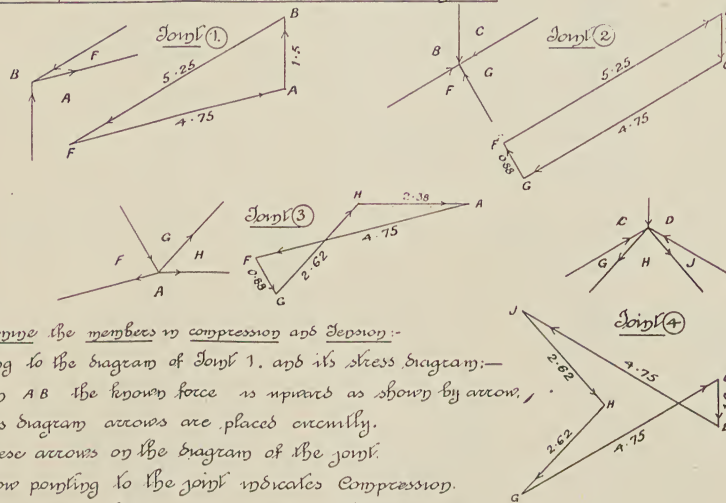
STRESS DIAGRAM—ROOF TRUSSES FOR DEAD LOADS.



— Table —

Member	Stress	Section required
BF & EK	5.25	T
CG & DJ	4.75	T
FA & KA	4.75	O or —
FG & JK	0.88	L
GH & JH	2.62	O or —
HA	2.38	O or —

The Separate Joints and their Stress Diagrams.



To determine the members in compression and tension:-

Referring to the diagram of Joint 1, and its stress diagram:-

1st Reaction AB the known force is upward as shown by arrow.

2nd On stress diagram arrows are placed centrally.

3rd Copy these arrows on the diagram of the joint.

4th An arrow pointing to the joint indicates compression.

5th do do from do do do tension.

Note, Great care and accuracy must be observed in this subject

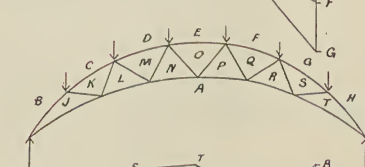
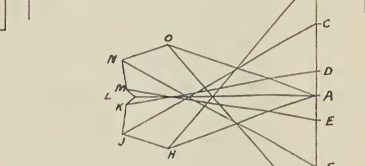
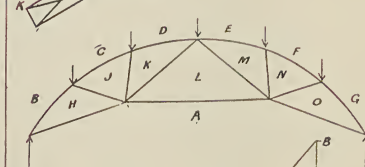
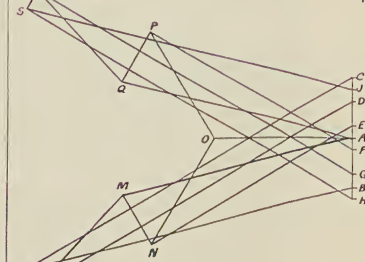
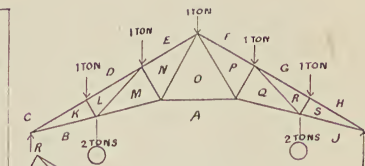
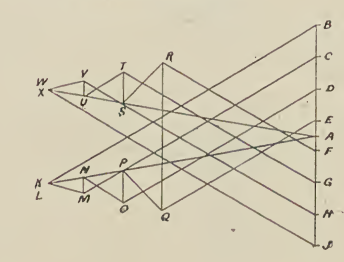
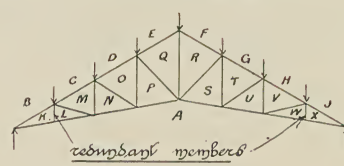
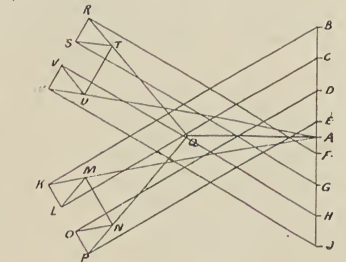
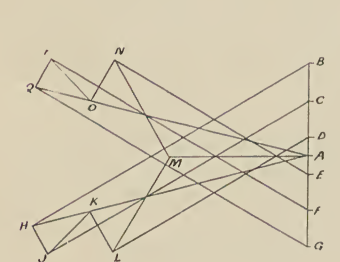
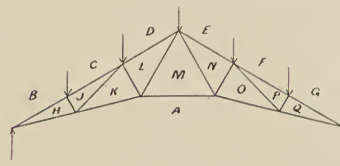
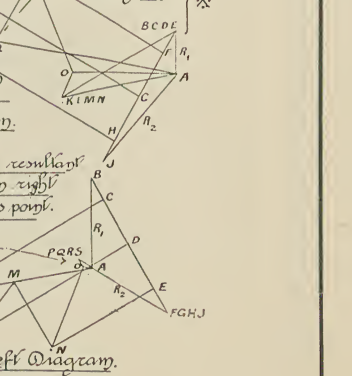
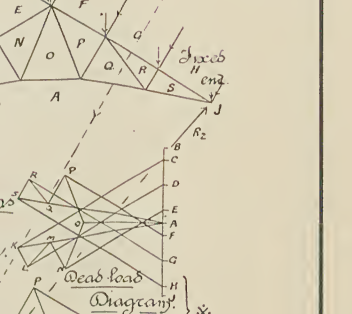
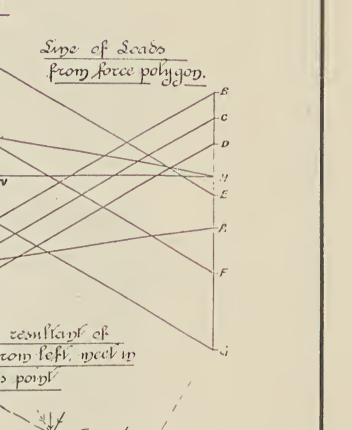
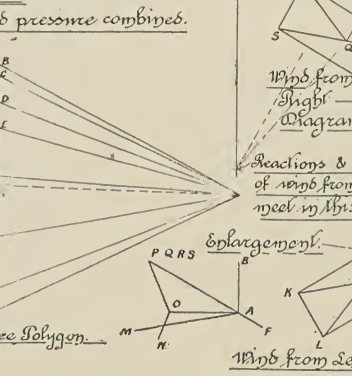
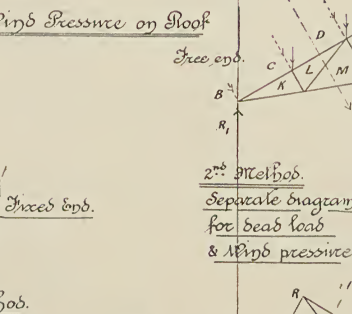
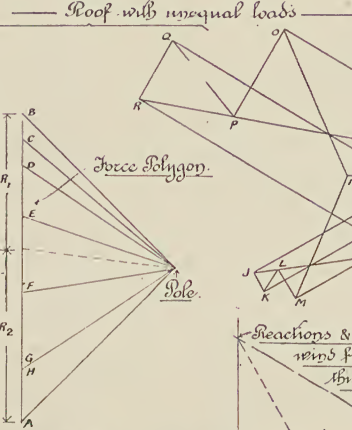
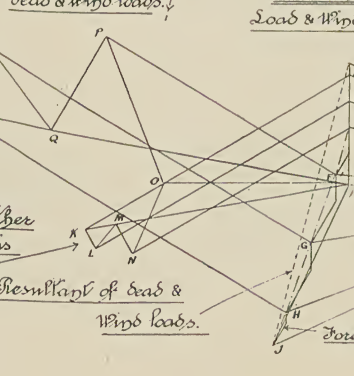
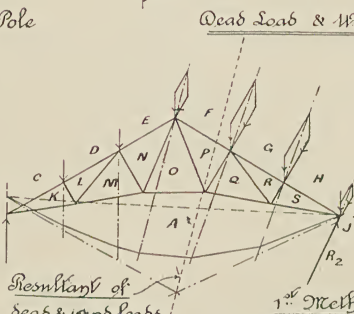
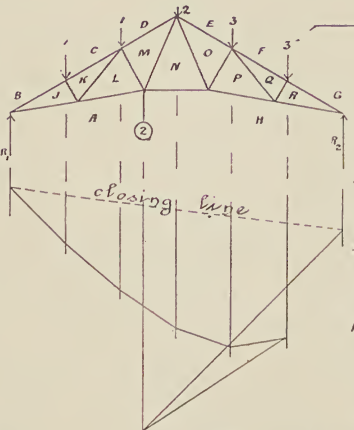
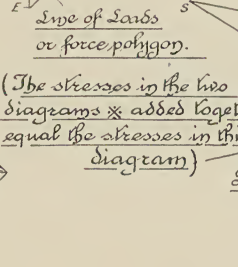
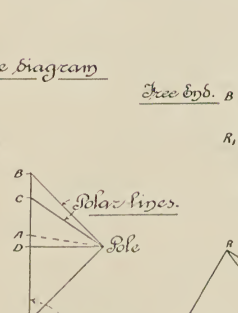
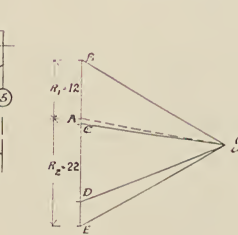
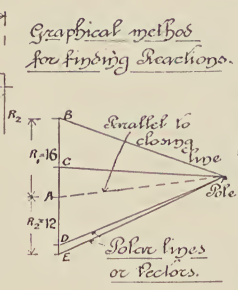
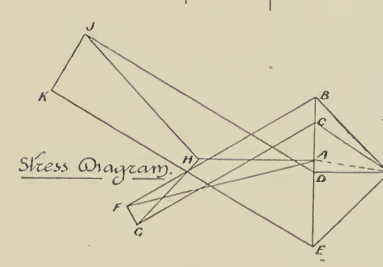
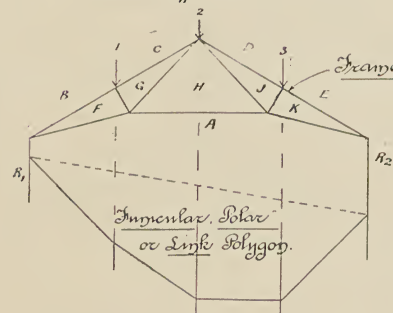
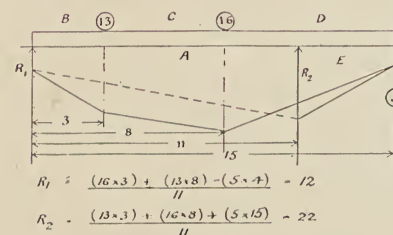
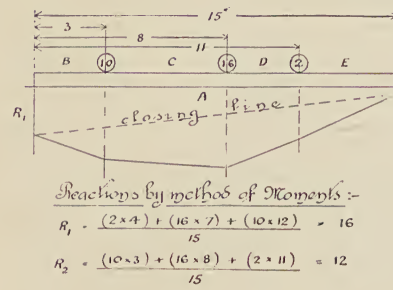


PLATE 109.

STRESS DIAGRAM—WIND AND DEAD LOADS.



(The stresses in the two diagrams added together equal the stresses in this diagram)

Resultant of dead & wind loads.

1st Method. Load & Wind pressure combined.

Roof with unequal loads

Line of Loads from force polygon.

Force Polygon.

Pole.

Dead Load & Wind Pressure on Roof

Free end.

Fixed end.

2nd Method.

Separate diagrams for dead load & Wind pressure.

Dead load Diagram.

Wind from Right Diagram.

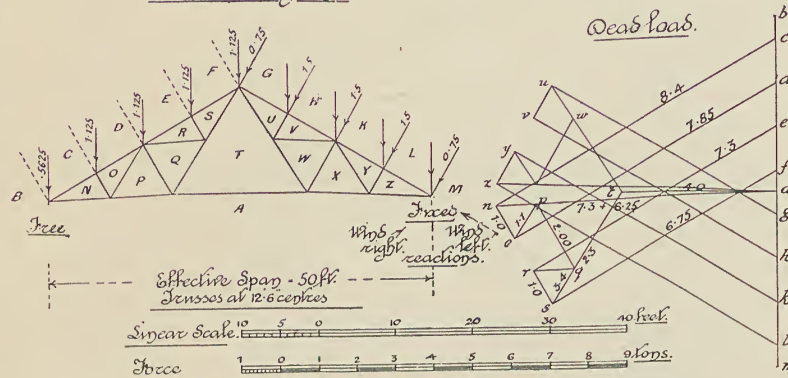
Reactions & resultant of wind from right meet in this point.

Enlargement.

Wind from Left Diagram.

STEEL ROOF TRUSS FOR 50-ft. SPAN.

Frame Diagram.



Stress Diagrams.

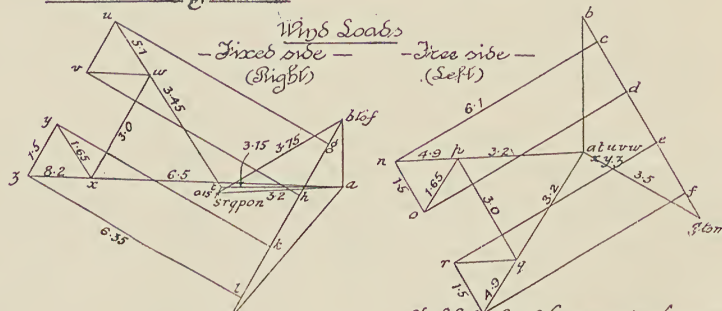


Table of Stresses (in tons)

Members	Dead load.	Wind load.		Maxim. Stress.
		Fixed side.	Free side.	
CN	+ 8.4	+ 3.75	+ 6.1	+ 14.5
DO	+ 7.85	+ 3.75	+ 6.1	+ 13.95
ER	+ 7.3	+ 3.75	+ 6.1	+ 13.4
FS	+ 6.75	+ 3.75	+ 6.1	+ 12.85
GU	+ 6.75	+ 6.35	+ 3.5	+ 13.1
HV	+ 7.3	+ 6.35	+ 3.5	+ 13.65
KY	+ 7.85	+ 6.35	+ 3.5	+ 14.2
LZ	+ 8.4	+ 6.35	+ 3.5	+ 14.75
NO	+ 1.0		+ 1.5	+ 2.5
PQ	+ 2.0		+ 3.0	+ 5.0
RS	+ 1.0		+ 1.5	+ 2.5
UV	+ 1.0	+ 1.5		+ 2.5
WX	+ 2.0	+ 3.0		+ 5.0
YZ	+ 1.0	+ 1.5		+ 2.5
NA	- 7.3	- 3.2	- 4.9	- 12.2
PA	- 6.25	- 3.2	- 3.2	- 9.45
TA	- 4.0	- 3.15		- 7.15
XA	- 6.25	- 6.5		- 12.75
ZA	- 7.3	- 8.2		- 15.5
QT	- 2.3	- 0.15	- 3.2	- 5.5
ST	- 3.4	- 0.15	- 4.9	- 8.3
UT	- 3.4	- 5.1		- 8.5
WT	- 2.3	- 3.45		- 5.75
OP	- 1.1		- 7.65	- 2.75
QR	- 1.1		- 1.65	- 2.75
VW	- 1.1	- 7.65		- 2.75
XY	- 1.1	- 7.65		- 2.75

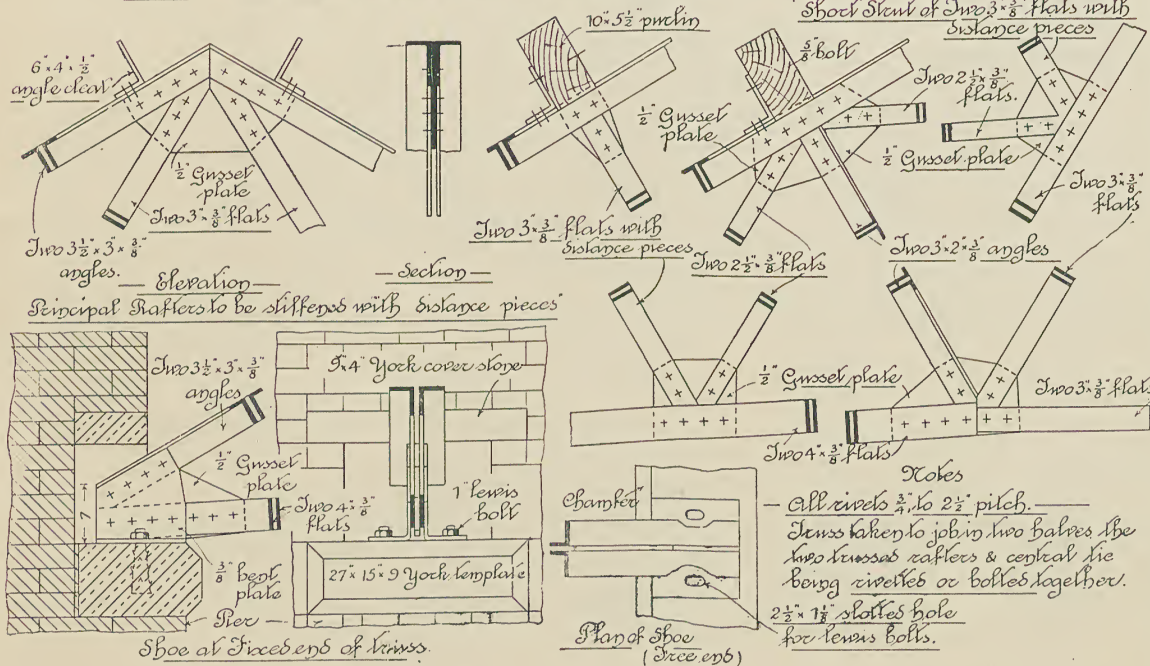
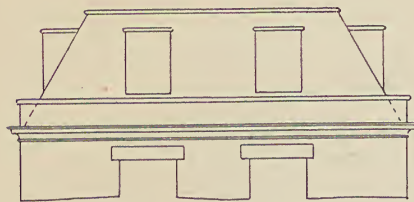


PLATE 112.

STEEL AND CONCRETE ROOF.



Elevation of Roof.

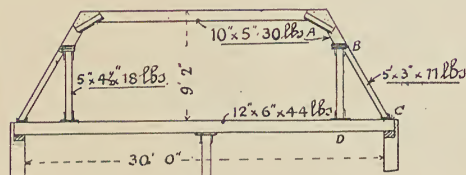
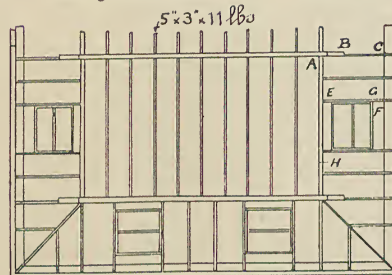
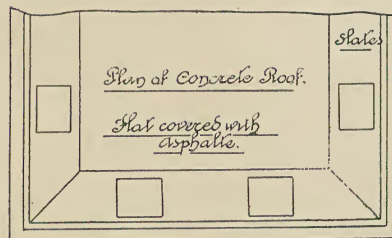


Diagram of Steel Construction.

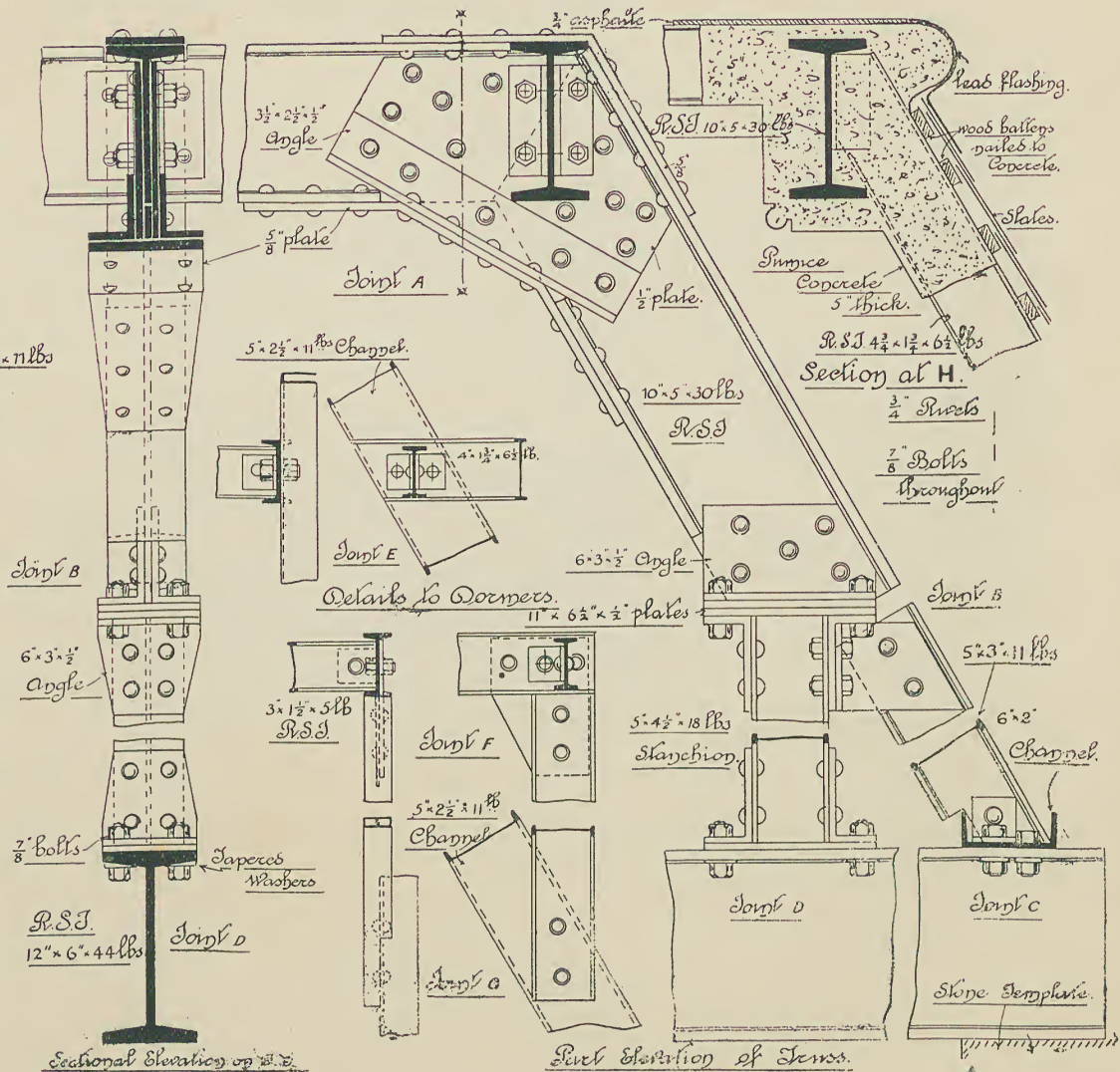


Skeleton Plan of Steel Work.



Plan of Concrete Roof.

Hat covered with asphalt.



Sectional Elevation of R.S.J.

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